JIG SAWS GO CORDLESS
7 TOOLS TESTED!

SPECIAL ISSUE: HOLIDAY GIFT GUIDE
EASY-TO-BUILD GIFT BOXES

WORKBENCH®

WOODWORKING TO IMPROVE YOUR HOME®

December 2004

custom built-in BOOKcases

Transform Any Room
—in two weekends
—for only $350

PLUS!

HOW TO MASTER
CROWN MOLDING

WORKBENCH
VOLUME 60 NO. 6

President & Publisher
Donald B. Peschke

Editor Tim Robertson
Senior Design Editor James R. Downing
Senior Editors Bill Link
David Stone
Associate Editor Wyatt Myers
Assistant Editor Kate Busenbarrick
Project Builder Mike Donovan

Art Director Kim Downing
Assistant Art Director Kurt Schultz
Senior Graphic Designer Doug Appleby
Senior Illustrators Erich Lage
Matt Scott

Editorial Director Terry J. Strohman
Executive Art Director Todd Lambirth
Creative Director Ted Kralicek
Sr. Project Designers Ken Munkel
Kent Welsh
Chris Fitch
Ryan Mimick
Shop Craftsmen Steve Curtis
Steve Johnson
Senior Photographer Crayola England
Contrib. Photographers Bruce Wagman, James Neal
Dennis Kennedy
Associate Style Director Rebecca Cunningham
Electronic Media Spec. Allan Ruhnke
Photography Intern Julia Adkisson

Group Director
Marketing and Sales J. Fritz Craiger
Adv. Sales Managers George A. Clark, Mary K. Day
Marketing Associate Nicolle Scott (515) 875-7135

Audit Bureau of Circulations

WORKBENCH (ISSN 0043-8057) is published bimonthly (Feb., April, June, Aug., Oct., Dec.) by August Home Publishing Company, 2200 Grand Ave., Des Moines, IA 50312.

Subscription rates: Single copy, $4.99. One-year subscription (6 issues), $22; two-year sub., $33; three-year sub., $44. Canadian/Intl., add $10 per year. Periodicals postage paid at Des Moines, Iowa, and at additional offices.
"USPS/Perry-Judd's Heartland Division automatable poly."
Postmaster: Send address changes to *Workbench*, PO Box 37272, Boone, IA 50037-0272.
Canadian Subscriptions: Canada Post Agreement No. 40038201. Send change of address information to: PO Box 881, Station Main, Markham, ON L3P 8M6.
Printed in U.S.A.

AUGUST HOME PUBLISHING COMPANY

Corporate Services: *Corporate Vice Presidents:* Douglas L. Hicks, Mary R. Scheve, *Controller:* Craig Stille, *Dir. of Financial Analysis:* Lesia Smith, *Sr. Accountant:* Laura J. Thomas, *Accounts Payable:* Mary J. Schultz, *Accounts Receivable:* Margo Petrus, *Elect. Pub. Dir.:* Douglas M. Lidster, *Prod. Dir.:* George Chmielarz, *Information Technology Mgr.:* Brian VanHeuverswyn, *System Admin.:* Cris Schwanebeck, *PC Maintenance Tech.:* Robert D. Cook, *New Media Mgr.:* Gordon C. Gaippe, *Web Site Art Dir.:* Eugene Pedersen, *Multimedia Designers:* Kara Blessing, Justin Gruca, *Web Server Admin.:* Carol Schoeppler, *Web Site Content Mgr.:* David Briggs, *Web Producer:* Terry Walker, *Research Coordinator:* Nicholas A. Jaeger, *Prof. Development Dir.:* Michal Sigel, *Benefits Specialist:* Jennifer Westover, *Hiring Specialist:* Jessica Tesar, *Office Mgr.:* Jeanne Johnson, *Admin. Ass't.:* Brandi Hammond, *Mail/Delivery Clerk:* Lou Webber, *Facilities Mgr.:* Kurt Johnson • **Circulation:** *Cir. Ops. Dir.:* Sandy Baum, *Cir. Marketing Dir.:* Wayde J. Klingbeil, *Renewal Mgr.:* Paige Rogers, *Cir. Strategic Business Analyst:* Kris Schlemmer, Paula M. DeMatteis, *Cir. Marketing Analyst:* Patrick A. Walsh, *Cir. Marketing Assoc.:* Christine Forret, *Fulfillment Mgr.:* Steph Forinash • **Products Group:** *Operations Dir.:* Bob Baker, *Customer Service Mgr:* Jennie Enos, *Warehouse Supervisor:* Nancy Johnson, *Buyer:* Linda Jones, *Asst. Buyer:* Nancy Downey, *Sr. Cust. Service Reps.:* Tammy Truckenbrod, Anna Cox, April Revell, Deborah Rich, Valerie Jo Riley, *Cust. Service Reps.:* Kim Harlan, Cheryl Jordan, *Warehouse Staff:* Sylvia Carey, Kim Freauff, Neil Nardini

Customer Service
Phone: 800-311-3991

Subscriptions
Workbench Customer Service
P.O. Box 842,
Des Moines, IA 50304-9961
Online:
www.WorkbenchMagazine.com

Editorial
Workbench Magazine
2200 Grand Ave.
Des Moines, IA 50312
email: Editor@Workbenchmag.com

EDITOR'S NOTES

One of the simple pleasures of woodworking is rummaging through the precious wood cutoffs you've squirreled away over the years and discovering a chunk that's just right for a special gift project. You know, one of those incredibly figured pieces of wood that practically shimmers when you tilt it in the light — like the quartersawn white oak we used for the potpourri tower in this issue *(page 67)*. With its distinctive ray-fleck figure, the oak promised to turn an attractive design into an absolutely stunning gift.

As dramatic as these flecks were, however, they turned out to be the proverbial tip of the iceberg.

In order to create the tapered sides of the tower, a large, wedge-shaped waste section had to be removed from each face of the tower. That reduced the thickness of the sides from 1" at the bottom to $1/4$" at the top. More to the point, cutting the tapers revealed something beneath the surface of the wood that was completely unexpected — long, narrow mineral streaks that resembled the fingers of a flame.

Well, these dark-colored veins certainly didn't fit my image of a project built from quartersawn white oak. And to be honest, my first impulse was to start over and build another one without any "defects."

Then something happened. The more I looked at the imperfections, the more I began to like them. They seemed to give the tower a unique and much more appealing character than the blemish-free quartersawn white oak I'd originally envisioned.

In the end, the mineral stains turned out to be a refreshing surprise. Not just because they made for an attractive gift. But because they were an apt reminder in this holiday season that if we focus on "flaws" — in wood or otherwise — there's a real risk of missing the true beauty and mystery inside.

Tim

Contents

WORKBENCH® December 2004

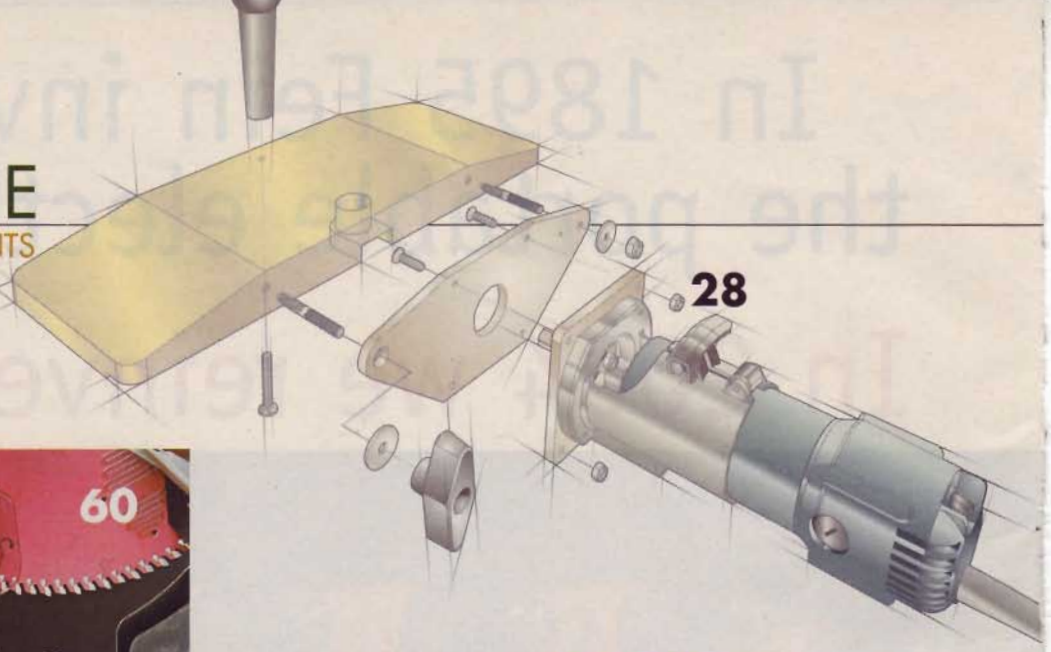
FEATURES

HOLIDAY GIFT PROJECTS

▼ Check out our technique for etching copper on page 77.

IN EVERY ISSUE

CONTENTS



Questions & ANSWERS

put a stop to SQUEAKY FLOORBOARDS

▲ To fix a squeaky floor without damaging it, drill pilot holes at an angle and drive a few finish nails through the tongue between two floorboards near the source of the squeak.

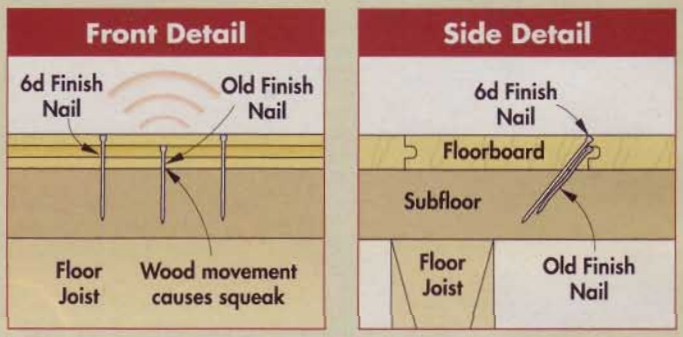
Q *I have an old home with a floor that squeaks in a few places when I walk on it. I've tried several unsuccessful methods to stop the squeaking. Any ideas?*

Robert Smith
Healdsburg, CA

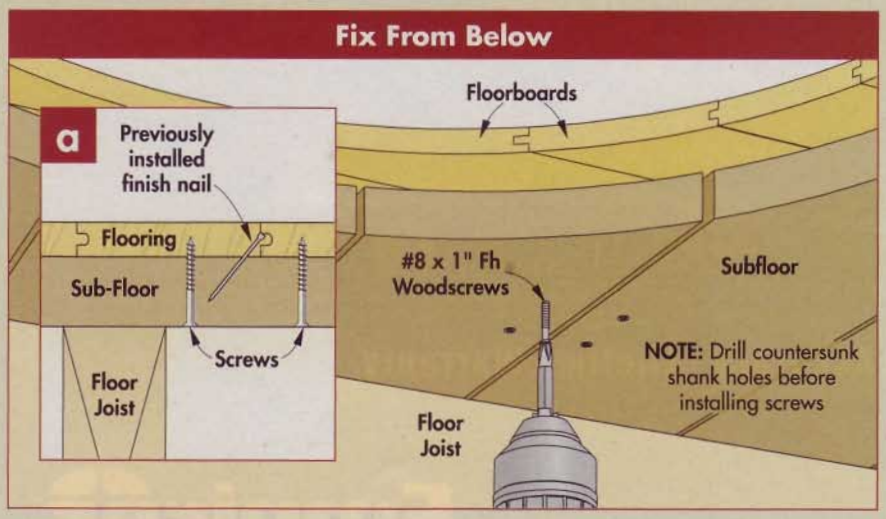
A This problem is common in older homes where wood planks were used as the subfloor rather than plywood. Usually, the cause of the squeaking is actually the nail itself moving up and down in wood that has dried out somewhat. A slight gap has developed between the floorboards and subfloor at this point, which results in the squeaking.

Fix from Below — To fix it, the idea is to fasten the floor and subfloor as tightly together as possible. If you have access to the subfloor from underneath (like in a basement with exposed floor joists), the best way to stop the squeak is to drill countersunk shank holes and run woodscrews up through the subfloor and into the floorboards at the source of the squeak *(see Illustrations below)*. This isn't an exact science, so have another person help you locate as precisely as possible the source of the squeak. Then, drive a handful of screws to draw the floorboards down.

Fix from Above — If you don't have access to the subfloor from below, there's another way to solve the problem without damaging the floorboards. All you need is a drill with a $^1/_{16}$" twist bit, a hammer and nail set, and a few 6d finish nails.



After locating the source of the squeak, drill angled pilot holes on either side of the squeaking area at the joint between two floorboards *(see Photo, above)*. Make sure the holes angle in on the *tongued* edge of the board. Pulling up an air vent is a good way to determine the direction of the tongues. Then, hammer and set the finish nails in these holes to secure the floorboard *(see Illustrations above)*. If this still doesn't do the trick, repeat the process with a few more finish nails around the area.



Got Questions? We Have Answers!

HOW TO SEND YOUR QUESTIONS:

Email: editor@workbenchmag.com
Forums: forums.woodnet.net
Mail: Workbench Q&A, 2200 Grand Ave., Des Moines, IA 50312

Include full name, address, and daytime phone number. You'll receive one of our handsome *Workbench* caps if we publish your letter.

▲ A random-orbit sander with dust collection is the best tool to use for consistent sanding results.

► Before you switch grits, make a quick pass with a shop vacuum.

6 keys to sanding SMOOTH SURFACES

Q *I've noticed I'm getting inconsistent results when I sand. I use the same series of grits (120-, 180-, and 220-grit) on all pieces. Between coats of stain, I lightly rub the surface with 0000 steel wool. What am I doing wrong?*

Tami Rebman
Via email

A Actually, the process you describe seems fundamentally sound. Like a lot of things with woodworking, it may be the little details that are causing inconsistent results.

One of the keys to sanding is to keep the surface as dust-free as possible. This keeps the workpiece relatively clean so you can check your work.

The best tool for dust-free sanding is a random-orbit sander with dust collection. When sanding with a random-orbit sander, follow a pattern so that you don't end up sanding the same area twice. This can be as simple as moving the sander smoothly back and forth across the workpiece, slightly overlapping your last pass with each successive pass *(see Main Photo, left)*.

Of course, there's some dust and debris that will escape the sander's dust collector. So when you're ready to switch grits, that's a good time to make a few passes with a shop vacuum to clean up excess dust *(Inset, left)*. That way, when you switch to a finer grit, you won't be grinding any stray grit from the coarser sandpaper into the surface.

As for that last pass with 220-grit sandpaper, this is better done by hand. This gives you a chance to take your time, check your work, and make sure you finish up right. Then, when you think you're ready to apply a finish, try the two tips below to check for any minor imperfections on the surface.

Checking Your Progress

Oftentimes, you're not quite finished sanding when you think you are. Minor scratches and imperfections hidden on a smooth workpiece may appear when a stain or finish is applied.

One way to prevent this is to use a worklight to check the workpiece from the side. This direct light focused at a low angle on the workpiece will make potential problem areas much more evident than a shop's standard lighting *(Fig. 1)*.

Another approach is to wipe the piece down with mineral spirits *(Fig. 2)*. A light coat will bring any scratches and imperfections that are difficult to detect with the naked eye to the surface. Plus, mineral spirits evaporates quickly, allowing you to do a quick touch-up before you begin staining or finishing.

power tool BRUSHES

Q *A friend told me that I need to check and replace the "brushes" on my portable power tools every once in awhile. What are these brushes? And how do I know when they need to be replaced?*

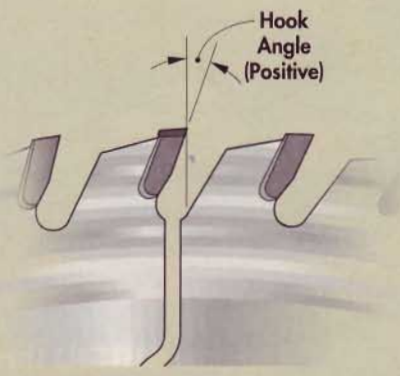
Colin Woods
Kansas City, MO

A On portable power tools like routers, sanders, and drills, the "brushes" are two carbon blocks that press against either side of what is known as a commutator. The brushes deliver power to the commutator, which in turn energizes the armature that spins the shaft of the tool.

When to Check Them — These carbon brushes are held in place against the commutator by springs. But the brushes wear down with age, which can make a tool run rough. A good rule of thumb is to check the wear on these brushes at least once a year. Or if you see excessive sparking inside the case through the ventilation slots, that's a sign the brushes need to be replaced.

Replacing Brushes — Some tools have removable caps that make it easy to access the brushes *(Photo, above left)*. Once you remove the brushes, check them for chips, burns, or excessive wear *(Photos, above)*. If new brushes are needed, replacement brushes are available from the tool's manufacturer.

saw blade HOOK ANGLES



Q *What does the hook angle on my saw blades refer to? And what's the advantage of a positive or negative hook angle?*

Kevin Ireland
Gainesville, FL

A The hook angle of a saw blade refers to the angle that the face of the tooth makes with a line projecting radially from the center of the saw blade to the tooth *(see Illustration)*. Hook angles range from -15° to 25°.

Positive — A positive hook angle enables an aggressive cut, which allows for a faster feed rate. This is why table saw blades usually have positive hook angles, and rip blades have larger hook angles than crosscut or finishing blades.

Negative — Negative hook angles cut less aggressively for more control and a cleaner finish. These blades are ideal for cutting metals and engineered materials like melamine and MDF. Negative hook angles are common on miter saw blades, as they help prevent stock from "climbing," or lifting up off the table, as the blade cuts.

AIRgrip LASER LEVEL

The AIRgrip laser level from Ryobi ($40) mounts to surfaces by using a small vacuum pump to hold it in position. Push a button, and the pump pulls the laser body against the surface, where it holds — even with the power off. This eliminates the damaging pins or adhesive strips required by many such tools. The AIRgrip's laser level rotates 360° and can be adjusted to cast a vertical or horizontal line.

The AIRgrip doesn't self-level but has vials that let you do the job. It comes with a baseplate that mounts to a tripod, plus a pair of pins you can use if the vacuum can't grab hold (such as on a rough surface). Visit www.Ryobi.com

▲ The AIRgrip laser level measures about 3" x 4" and is lightweight, so it will stick to surfaces using its built-in vacuum pump. The laser tool includes a carrying case that also holds batteries, an auxiliary base, and a strap for mounting it to odd-shaped objects.

no-sweat seal JUST-FOR-COPPER

I think they refer to soldering copper pipe joints as "sweating" for a reason, and it's not because you melt the solder and fill the joint. It's because you "sweat it" as you try to heat the pipe without catching anything on fire, and "sweat it" some more as you turn on the water to search for leaks.

So when I saw Just-For-Copper Solderless Copper Bonding, I had to give it a try. After cleaning the pipe, you just put a few drops of this liquid onto one of the pieces to be joined, put the pieces together, and give them a twist to distribute the liquid. That's all it takes. No solder, no torch, and no sweat.

Just-For-Copper bonds rigid copper pipe and makes a tight seal for water and natural gas. A 10-gram bottle ($15) bonds about 40 joints in $1/2$" pipe. A 50-gram bottle ($25) bonds 200 joints. To learn more, visit www.JustForCopper.com

bosch TABLE SAW STAND

The TS2000 Gravity-Rise table saw stand ($150) from Bosch aims to simplify moving and using your jobsite saw. The stand folds up, rolls on large wheels, then opens with the flip of one lever. It uses the saw's weight to help the legs swing open. Though designed for the Bosch 4000-series saw, the TS2000 holds other brands, too. Visit www.BoschTools.com

FOLDED

OPEN

handcrafted Organs

In a large cabinet shop in Lake City, Iowa, Lynn Dobson *(left)* and his staff produce some of the most beautiful pipe organs in the world. Here, Lynn is shown with "Opus 71," a 25-foot tall organ that was installed in a church in Greensboro, North Carolina, in 1999. To learn more about the intricate woodworking involved in a process that Lynn calls "heroic cabinetmaking," turn to page 104.

large-scale CABINETRY

Lynn Dobson describes the work that goes on in his shop as "heroic cabinetmaking." Once he explains what goes into a Dobson Organ, the term makes sense.

"Our shop is a lot like any other cabinetmaking shop," says Lynn, "but everything is on a huge scale. Each cabinetmaker is working on a large section that has to fit just right. A lot of collaboration goes into it."

Many other considerations go into a musical instrument of the highest quality. Dobson Organs are made with thick wood to dampen vibration, and the boxes are kept simple to produce fine acoustics. Joinery includes time-tested techniques like dovetails or mortise-and-tenon joints.

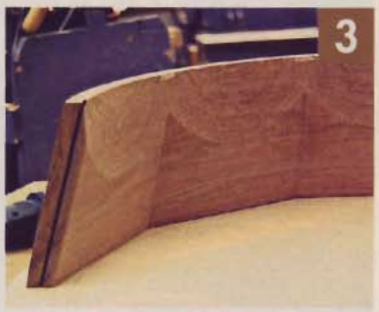
But it's the elaborate moldings and profiles that really make a Dobson Organ stand out. In these details, Lynn strives to match the architecture of the church, as with the curved corner towers on this "Opus 70." For some insight into how these corner towers were constructed, see the *Photos* at right and below. And for more information on Dobson Organs, visit www.DobsonOrgan.com

▲ The corner towers on this "Opus 70" feature curved moldings and raised panels made of white oak. The organ was installed in this church in 1998.

MAKING CURVED TOWERS

▲ To make a curved molding, Lynn starts by gluing pieces together into a trapezoid, using splines for alignment.

▲ The outer radius is formed by cutting the waste material with a band saw, then sanding the surface smooth.



▲ Next, the inside of the molding is cut to shape with a band saw so it will fit in place on the curved tower.

▲ The large, solid-wood molding mounts to a plywood base that is bent to shape on a cylindrical form.

▲ To assemble these bases, multiple layers are glued up and bent around the form with band clamps.

▲ A plywood ring and dowel handles aid in shaping a narrow molding that will cap the larger molding.

Tips & techniques

▲ Used with a cargo strap, these corner clamps prevent miter joints from slipping out of alignment, and they help square up a project.

◄ Tightening the cargo strap around the corner clamps pinches the miters together, creating a tight-fitting joint.

corner clamps make TIGHTER MITERS

Gluing up a project with mitered corners can be a frustrating experience. You have to apply enough clamping pressure to draw the joints together, but not so much it causes the miters to slip out of alignment.

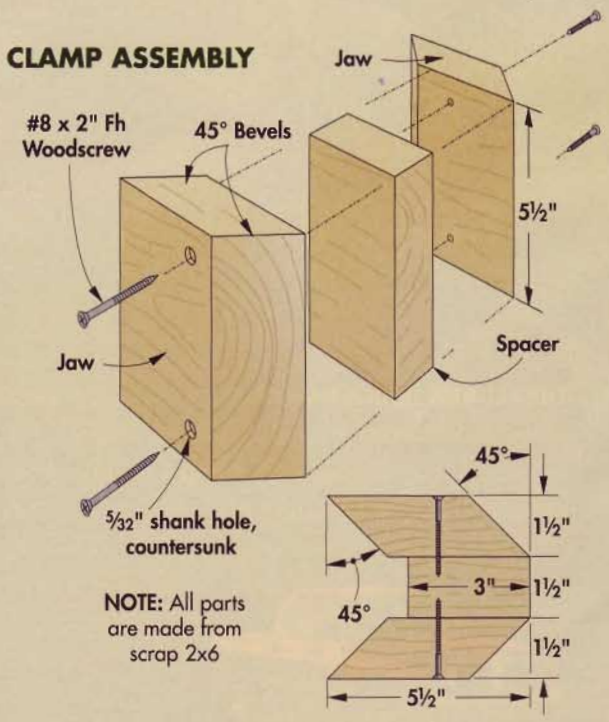
To simplify the job, I made a set of four corner clamps to use with a ratchet-style cargo strap. (This type of strap is available at many auto parts stores and home centers.) Tightening the strap around the corner clamps *(Inset Photo)* keeps the miters aligned. Plus, it automatically squares the box.

Each corner clamp consists of two jaws with a spacer sandwiched between them *(Corner Block Assembly)*. The jaws are beveled at a 45° angle on both ends. The bevels in back allow the strap to exert pressure directly on the spacer. In front, the beveled jaws pinch the miters together as you cinch the strap, creating a tight fit.

To protect the tips of the miters, set the spacer back in from the jaw opening (flush with the back of the jaws). Then screw the corner clamps together.

Robert DeGraw
Kirkland, WA

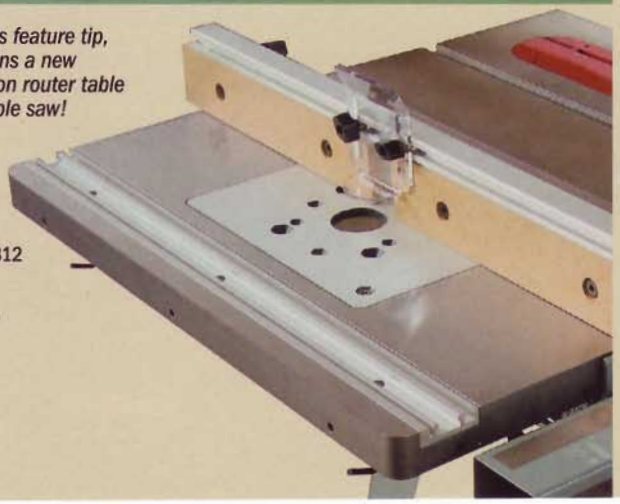
CLAMP ASSEMBLY



NOTE: All parts are made from scrap 2x6

BEST TIP!

For sending us this feature tip, Robert DeGraw wins a new Bench Dog cast-iron router table extension for a table saw!



Mail Tips to:
Workbench Tips & Techniques
2200 Grand Ave.
Des Moines, IA 50312

Email: editor@workbenchmag.com

quick & easy CUTTING TABLE

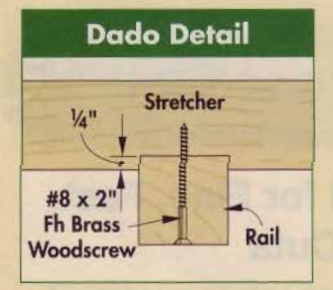
When cutting sheet material with a circular saw, it must be fully supported to prevent the blade from binding. This cutting table does just that. Laid across sawhorses (or on a garage floor), it provides a flat, stable surface for cutting sheet stock.

The table is an open wood frame made up of 2x2 stretchers and rails *(Table Assembly)*. A series of shallow dadoes in the rails accept the stretchers *(Dado Detail)*. And brass screws hold the frame together.

Dennis Satriano
Center Moriches, NY

▲ A 2x2 frame supports a large sheet of material, so you can make a cut without having the blade bind.

Dado Detail



Layout Detail

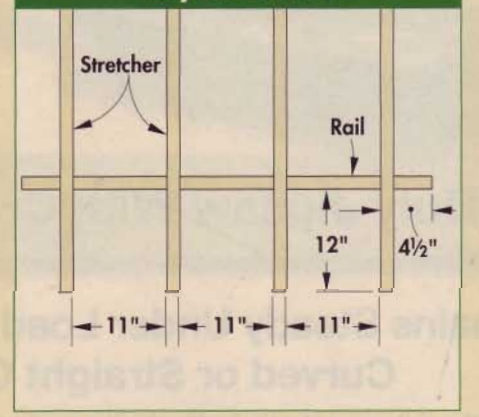
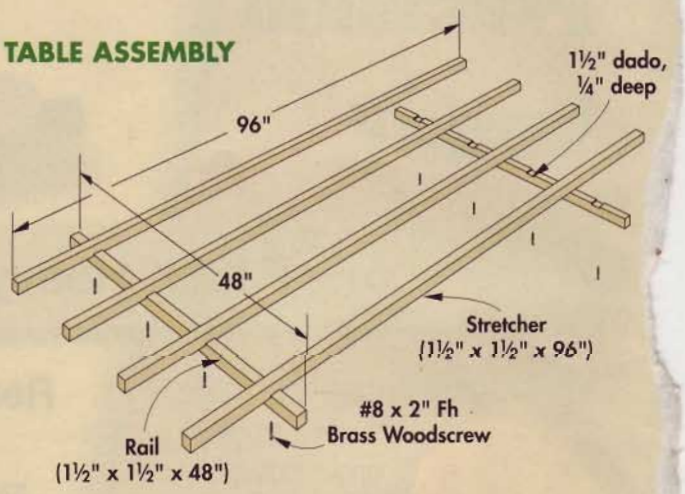


TABLE ASSEMBLY



Quick Tips!

Pegged Pony

Sawhorses are an indispensable shop aid, but they of course provide no storage for tools you use on and around them.

Riv Daigle of Brandon, MS, however, came up with a great way to keep tools off the ground and out of the way, while still near to hand. He drilled angled holes in his sawhorses for dowels that act as pegs to hang tools and accessories on.

Glue Tool for Tight Spaces

To get glue into a loose joint or hairline crack, *Ralph Lipeles of Monroe, CT*, uses the thin, flexible blade of an artist's palette knife. (Palette knives are available at most art stores.)

three tips for BeadLOCK JOINERY

Even though I've been using the BeadLOCK loose-tenon joinery system for awhile, I picked up some valuable pointers from the article in the October 2004 issue of *Workbench*. So I thought I'd return the favor with a few tips of my own.

For example, something as simple as filing the straight edge of the D-shaped "window" on the jig to a 45° angle can help you align the jig more accurately *(see Fig. 1 below)*.

Another thing I've run into is the jig sometimes slips while drilling holes. Sandpaper takes care of that *(Fig. 2)*.

Finally, though the jig comes with shims for different stock thicknesses, you can expand its capabilities by making spacers of your own *(Fig. 3)*. This requires making longer lock knobs from threaded rod and plastic knobs with inserts.

Riley Goforth
Chicago, IL

▲ Filing the straight edge of the D-shaped opening to a 45° angle makes it easier to see the layout line when aligning the jig.

▲ To provide extra grip that keeps the jig from slipping while you drill the holes, attach self-adhesive sandpaper to the face plate.

◄ Using wood blocks as spacers lets you center the drilling guide on extra-thick stock. I keep several spacers on hand for different stock thicknesses. Label the blocks for quick setups.

Put an End to Spoiled Finishes

No matter how tightly you reseal a can of varnish, the air in the can forms a thick skin on the remaining portion of the finish. Removing this skin is a messy job, plus it wastes a considerable amount of expensive finish.

To solve those problems, *Jack Sullivan of Davenport, IA*, fills plastic containers with the unused finish. Since the containers are full, no air can get in to spoil the finish. By keeping several different-size containers on hand, he always has one that's the right size for the amount of finish that remains. The containers also double as a handy dispenser.

Dowel Organizer

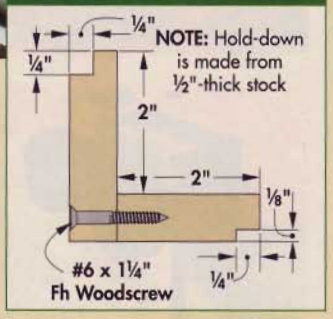
Here's a simple way to keep dowels organized. Store them in different-length sections of square vinyl gutters like *James Kreisel of Yakima, WA*, does.

To see the dowels at a glance, the top of each gutter is cut at an angle. A wood plug keeps dowels from falling through the bottom. Pop rivets hold the assembly together, which can be hung on the wall or set on the floor.

hold-down provides CONTROLLED CUTS

▲ This hold-down prevents a thin sheet of material from lifting off a table saw. A lip on each edge keeps either 1/8" or 1/4" material flat on the saw.

End View



There are several things to think about when cutting a thin sheet of material on a table saw. Not the least of which is providing enough downward pressure so the sheet won't "ride up" over the saw blade, causing a potentially dangerous kickback.

To ensure a safe, controlled cut, I clamp an L-shaped hold-down to the rip fence on the table saw *(see Photo at left)*. A different-sized rabbet in each edge of the hold-down forms a recess for either 1/8"-thick or 1/4"-thick material *(End View)*. As you make a cut, the thin sheet slides under the lip formed by the rabbet, preventing it from lifting off the table saw.

The hold-down shown here is made of 1/2"-thick stock, but plywood would also work well. Just make sure the pieces are nice and straight. Cut the rabbets to match the thickness of the material you'll be working with most often. Then, after screwing the hold-down together, clamp it to the fence so the appropriate side is lying on the table saw.

Steve Holz
Kewaunee, WI

shelf-pin pockets STOP SLIDING

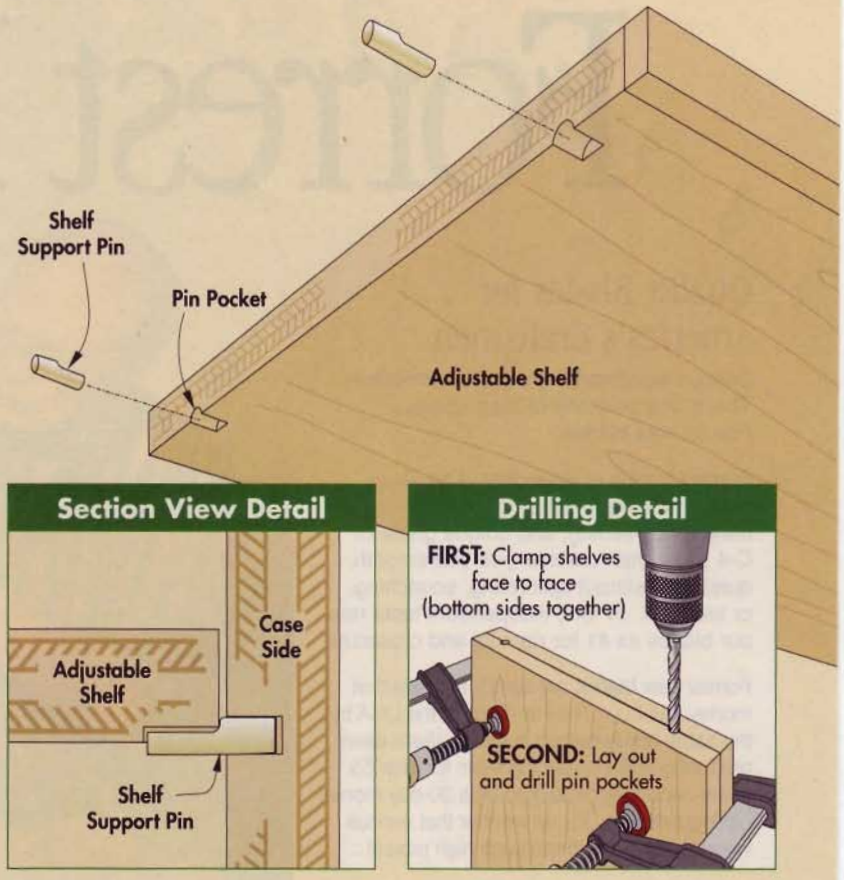
The very thing that makes adjustable shelving (the kind that rests on movable shelf support pins) so versatile can also create a problem. Because it's not fixed in place, an adjustable shelf can slide forward on its support pins when you remove an item from it.

But here's a way to "lock" the shelves in place — without sacrificing adjustability. The shelf pins are simply captured in shallow, semi-circular pockets made in the bottom of the shelf *(Main Illustration, right)*.

An easy way to create the pockets is to start by clamping two shelves face to face, making sure the bottom sides are together *(Drilling Detail)*. Then lay out the location of the pockets so they align with the already-drilled shelf pin holes in the sides of the cabinet.

Once you've marked the locations, drilling a single hole simultaneously creates pockets in both shelves. **Note:** For ease in installing the shelves, drill the holes slightly larger and deeper than the "blade" of the support pin *(Section View Detail)*.

Hugh Boettcher
Independence Center, IA



Finishing Fundamentals

a painting primer
BRUSHING TIPS

Some projects just look better painted than stained. This is especially true of the built-in bookcases on page 50, which are constructed of medium-density fiberboard and then trimmed with poplar. Whether you decide to build and paint the bookcases, or another project, here are a few tips that will help turn a good paint job into a great one.

Tint the Primer — For starters, using a primer is a must. Using a *white* primer, however, is not. If you plan to use a dark-colored paint, getting complete coverage over the white primer (no light-colored streaks) may take two, or even three, coats. A good solution is to use a primer that's tinted to match the "color-coat" *(left)*. Primers can be easily tinted at the paint store. Or make your own by stirring a small amount of paint into the primer.

Load the Brush Properly — Whether you're working with primer or paint, it's essential to start the job with a properly loaded brush. The key is to load paint onto only the lower third of the bristles. To make this easy, pour a small amount of paint into a transparent container to a depth that equals one-third the length of the bristles. This way, when you dip the brush into the container, you can't overload it *(Inset Photo, above right)*. Lift the brush, tap it against the sides of the container a couple of times, and you're ready to paint.

▲ After loading a sash brush *(right)*, the trick to "cutting in" is to work toward the adjacent surface, flexing the bristles to release a smooth line of paint.

"Cut In" Correctly — Before painting large areas, you'll have to "cut in" around adjoining surfaces. Professional painters are great at this technique — painting right up next to, but not actually hitting, the adjacent surface. First of all, don't even try this without a high-quality brush *(see Sidebar below)*. Also, it's important to use a sash brush — that is, a brush where the ends of the bristles are trimmed at an angle.

When cutting in, the goal is to lay down a smooth, straight line of paint, which is easier said than done. To get the feel of it, it's a good idea to practice on some scrap material.

Start by holding the brush *away* from the intended paint line to see how much paint your brush is actually unloading. Then gradually move the tips of the brush closer to the line, slightly flexing the bristles to release a fine line of paint.

Brush Up On the Basics

A word of advice. Spend — no, *invest* — the money ($15 to $25) to get a high-quality paint brush. You won't be disappointed.

Natural or Synthetic? — For best results, be sure to use natural-bristle brushes for oil-based paints and finishes. Synthetic bristles are better for latex paints and water-based finishes. Synthetic brushes have nylon and polyester bristles that absorb very little water and won't deform during use.

Feel for Softness — Beyond that, remove the paper "keeper" from the brush and fan the bristles against your hand. They should feel soft and supple, a good indication that the bristles are split at the ends. This is one instance when having "split ends" is a good thing.

Finishing Fundamentals

tips & tricks on
ROLLING PAINT

▲ To load a roller, "pull" a line of paint from the reservoir. Then roll it back and forth to coat.

► Bushings in these rollers produce a smooth painted finish. The rollers' small size is ideal for tight spaces.

There's more to rolling paint than you might expect. As with brushes, using good quality equipment and the proper technique will pay off in a professional-looking paint job.

Equipment — Of course, the two essential pieces of equipment are a roller frame (which includes the handle and a holder for the roller) and the roller itself. Instead of the cage-style roller frame, I prefer one with a simple metal rod *(Photo, below left)*. The rod fits into a bushing in the end of the roller, producing an incredibly smooth rolling motion. The result is a smooth, painted surface, which is especially important on a project like the MDF bookcases. Selecting rollers with a short nap also contributes to a smooth painted finish. (I used $^1/_2$"-nap rollers to paint the bookcase.)

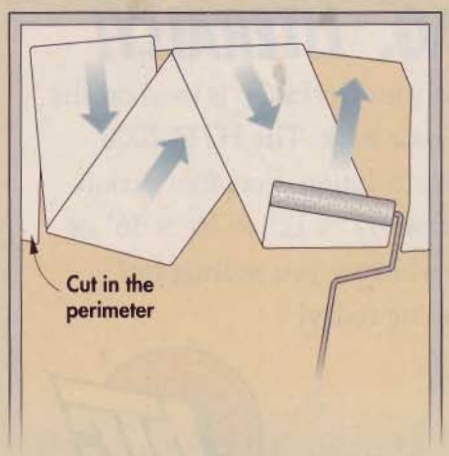
Work from the Top Down — Before you get started, work out a plan. You'll want to start at the top of the bookcase (or wall) and work your way down. This will prevent drips or runs from landing on already painted areas. Even so, it's still important to smooth any drips on unpainted surfaces with a brush. This way, when you get to that section, you won't have to deal with drying globs of paint, which are difficult to blend in.

Keep a Wet Edge — Along those same lines, to create a seamless transition from a brushed to a rolled area, it's best to work with a "wet" edge as much as possible. This means "cutting in" a small section (about three-feet square) with a brush, then rolling over it with wet paint.

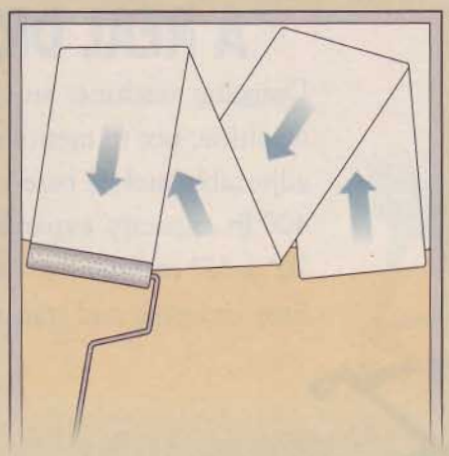
Load the Roller — *Here again, how you load paint on the* roller makes a difference. For even coverage (and to avoid a big mess), I saturate the roller as shown in the *Photo* above.

Roll in a W-Shaped Pattern — Once the roller is properly loaded, roll the paint from side to side in a W-shaped pattern *(see Illustrations below)*. This zig-zag motion distributes the paint more evenly than rolling it straight up and down. Plus, it keeps you from missing any spots.

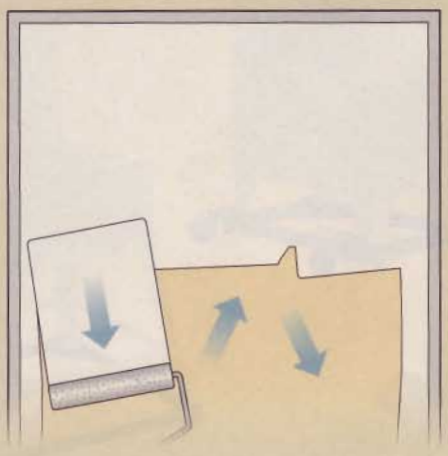
READY TO ROLL: ZIG-ZAG PATTERN GIVES EVEN COVERAGE



▲ After using a brush to "cut in" around the sides and top of the bookcase, roll the paint in a W-shaped pattern.



▲ Using the same zig-zag pattern, work your way back across the surface, filling in the unpainted areas.



▲ Once the upper area is painted, cut in a fresh section lower down and repeat the rolling pattern.

TIPS FROM THE WORKBENCH SHOP

trim-router jig for ACCURATE EDGING

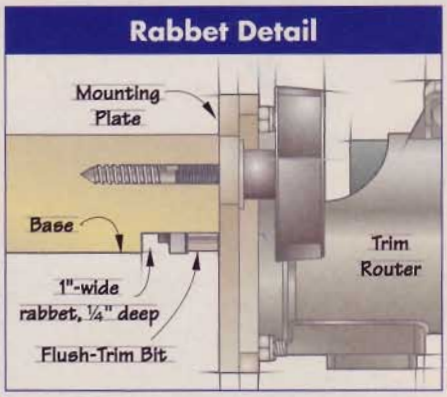
▲ For accurate flush-trimming, a wide wood base and rigid phenolic plate hold a trim router and bit square to the edging.

When adding hardwood edging to a shelf, as I did on the built-in bookcases *(page 50)*, it's simpler to cut the edging a bit wide, and then then trim it flush with the surface of the shelf. A trim router does this job well, but it requires standing the shelf on edge and running the router along the narrow edge on top. As a result, it's all too easy to accidentally tip the router and cause the bit to gouge the shelf or edging.

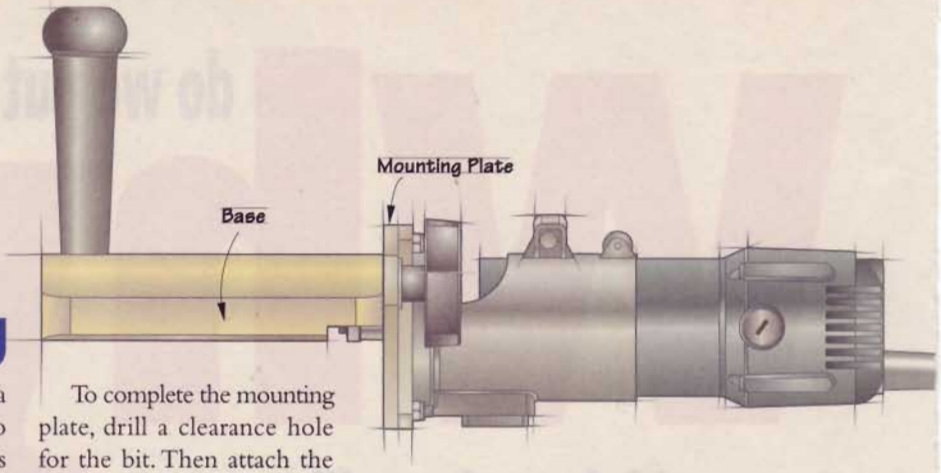
No-Tip Jig — To eliminate that tipping problem, our Senior Design Editor, Jim Downing, came up with a simple jig for his trim router that lets him trim the edging flush while the shelf is lying *flat* on a worksurface.

As you can see in the *Photo* at left, the stability of this jig comes from a wide wood base that you slide across the top face of the shelf. Note also that there's a rabbet in the edge of the base that provides clearance for the protruding lip of the edging *(see Rabbet Detail)*.

To ensure accuracy, the cutting edges of the flush-trim bit must stay perpendicular to the edging. That's the job of a rigid phenolic plate, which is used to mount the trim router to the base. To make small adjustments to the height of the bit, one of the mounting holes in the plate is oversize. (For complete details on building the jig, see page 30.)



Building the Flush-Trim Jig



This trim-router jig has two parts: a base and a mounting plate. It's best to start with the mounting plate as it's used to lay out holes in the base.

Mounting Plate — For strength, the mounting plate is 1/4"-thick phenolic, which is a hard, durable plastic. (Phenolic is available from Highland Hardware at 800-241-6748, or go to www.HighlandHardware.com)

A band saw (or jig saw) makes quick work of cutting the mounting plate to shape *(Mounting Plate, below)*.

To mount the plate to the trim router, you'll need to lay out and drill several holes. These holes must align with the existing holes in the base of the trim router. Using those holes as a guide, lay out and drill the holes in the mounting plate.

You'll also need to drill two holes for attaching the mounting plate to the jig. Note that one hole is oversize so you can adjust the bit height.

To complete the mounting plate, drill a clearance hole for the bit. Then attach the plate with replacement mounting screws that thread into the base of the router. (The existing mounting screws will probably be too short.)

Build the Base — The base is cut to size from 1 1/2"-thick hardwood. Be sure to joint and plane the stock to ensure square, true surfaces. Then cut the wide, shallow rabbet in the edge of the base. (Remember, it provides clearance for the shelf edging.)

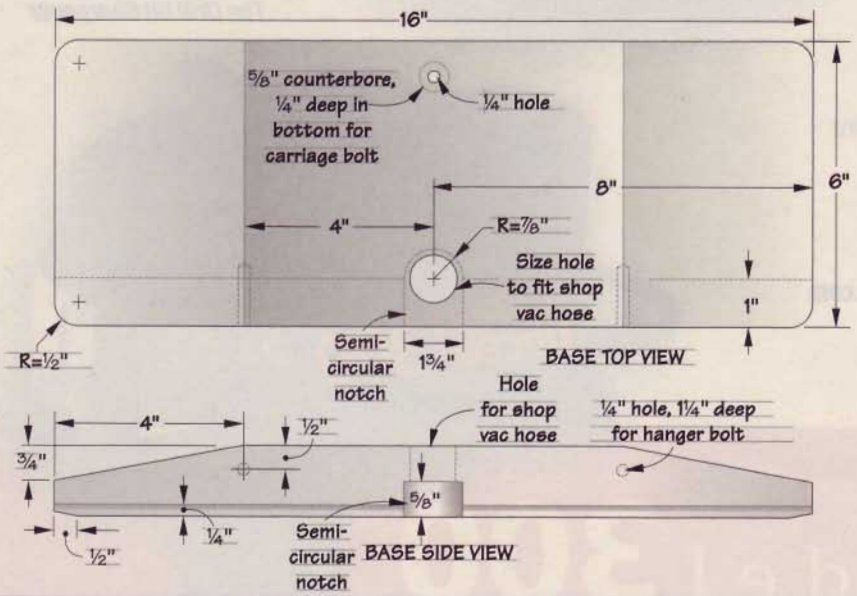
The flush-trim bit also needs clearance. That's accomplished with a semicircular notch in the bottom of the base. Cutting this notch is a two-step process. First, drill a shallow counterbore with a Forstner bit. Then use a chisel to connect the hole with the edge of the base.

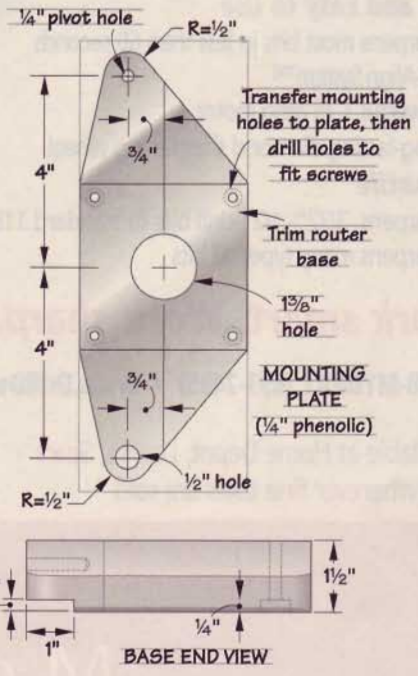
There are a few final details to take care of. For dust control, drill a hole to fit your shop vacuum hose. Also, drill a counterbore for the bolt that secures the handle. To allow the base to slide smoothly, sand a bevel around the bottom edges. And use a band saw to cut two wide bevels on top to ease the sharp edges.

Attach Trim Router — All that's left is to attach the trim router to the base. It's secured with hanger bolts, a lock nut, and a plastic knob *(see Illustration on page 28)*.

An easy way to locate the hanger bolts is to install a flush-trim bit in the router and use the holes in the mounting plate as a guide. The goal is to align the cutting edges of the bit with the bottom of the base. That done, check to see that the bit is centered on the clearance notch, then mark and drill the holes in the base.

PARTS VIEW





TIPS FROM THE WORKBENCH SHOP

tip for taming BELT SANDERS

After cutting all four faces of the potpourri box *(page 67)* with a band saw, they needed some aggressive sanding to get them flat and smooth.

Of course, the easiest way to sand them is with a stationary belt sander. But if you don't have one, a portable belt sander will work, *if* you take a few extra precautions.

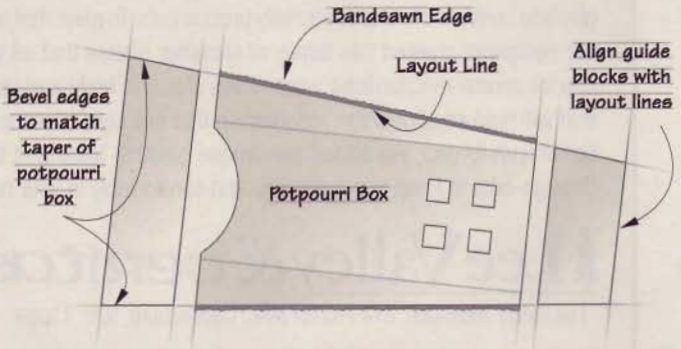
The biggest problem with a belt sander is control. The tool removes stock so quickly that it's very easy to round over the ends of the tower.

To prevent this, make a pair of guide blocks from scrap 2x stock. Make one block slightly wider than the base of the potpourri box, the other slightly wider than the top. Cut both longer than the box width.

Next, bevel two opposing edges of each block, making each block match the finished dimensions you're after for the potpourri box. **Note:** Use the box itself to set up the saw to cut these bevels.

Now, clamp the blocks in place, as shown in the *Photo* at right. Make sure to align them with the layout lines on the box.

Tighten the entire assembly between bench dogs, and sand each box side smooth using a 120-grit belt. Then follow up with a random-orbit sander.



align miters with CLAMP BLOCKS

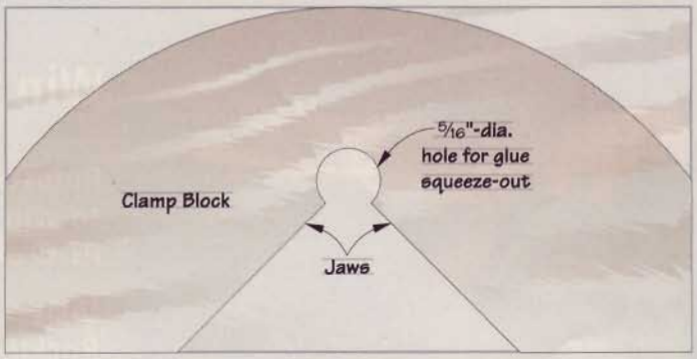
A band clamp does a great job of applying even pressure when gluing up boxes and other square projects. But if the project has mitered corners, like the lid on the potpourri box *(page 67)* or a picture frame (*Photo*), then a band clamp has problems.

The main problem is that there's no way to keep the mitered corners aligned. Plus, the band may not pull tightly around those sharp corners, producing uneven clamping pressure. Even worse, it may crush the fragile outside corners of each miter.

For those reasons, I came up with these simple corner blocks that work with a band clamp to hold mitered corners at 90°. The jaws of the blocks form a 90° opening to "hug" the frame. Their rounded outside edges let the band slide easily, and the hole in each prevents glue squeeze-out from sticking to the blocks.

To make the clamp blocks, first cut a series of blanks to size from $^3/_4$" stock to match the *Full-Size Pattern* that's shown below. Then, apply the pattern to each blank, and drill the hole where shown. Next, use a band saw to cut the jaws and rounded outside edge on each block. Finally, sand the edges smooth to complete the clamp blocks.

FULL-SIZE PATTERN ►
You can trace this pattern or make four photocopies, then attach the patterns to your blanks using spray-mount adhesive. Or use it as a reference and draw the shape freehand.



TIPS FROM THE WORKBENCH SHOP

miter saw jig

FOR CROWN CUTS

When working with crown molding, getting a tight-fitting corner joint is all about making accurate compound angle cuts. This requires taking *two* angles into account: the spring angle of the molding (the angle it projects from the wall), as well as the angle of the corner.

One way to simplify things is to use a miter saw jig that holds the molding at its spring angle *(Photo, right)*. This way, with the molding tilted against the jig, all you have to do is cut a 45° miter.

Build the Jig — It only takes a few minutes to build a jig to fit your miter saw. The one shown here is made of ¾" plywood, but it's a good project for using whatever scrap material you have on hand.

The jig consists of three pieces: a base, a fence, and a stop *(Miter Jig Assembly Illustration)*. As you can see in the *End View*, the base and the fence support the crown molding at its spring angle during a cut. The stop simply prevents it from slipping off its spring angle.

It's easy to determine the length of these pieces. They match the length of the miter saw. The base has to be wide enough so that the kerfs made by the saw blade won't go all the way to the outer edge. For the fence, just be sure it's tall enough to support the crown molding.

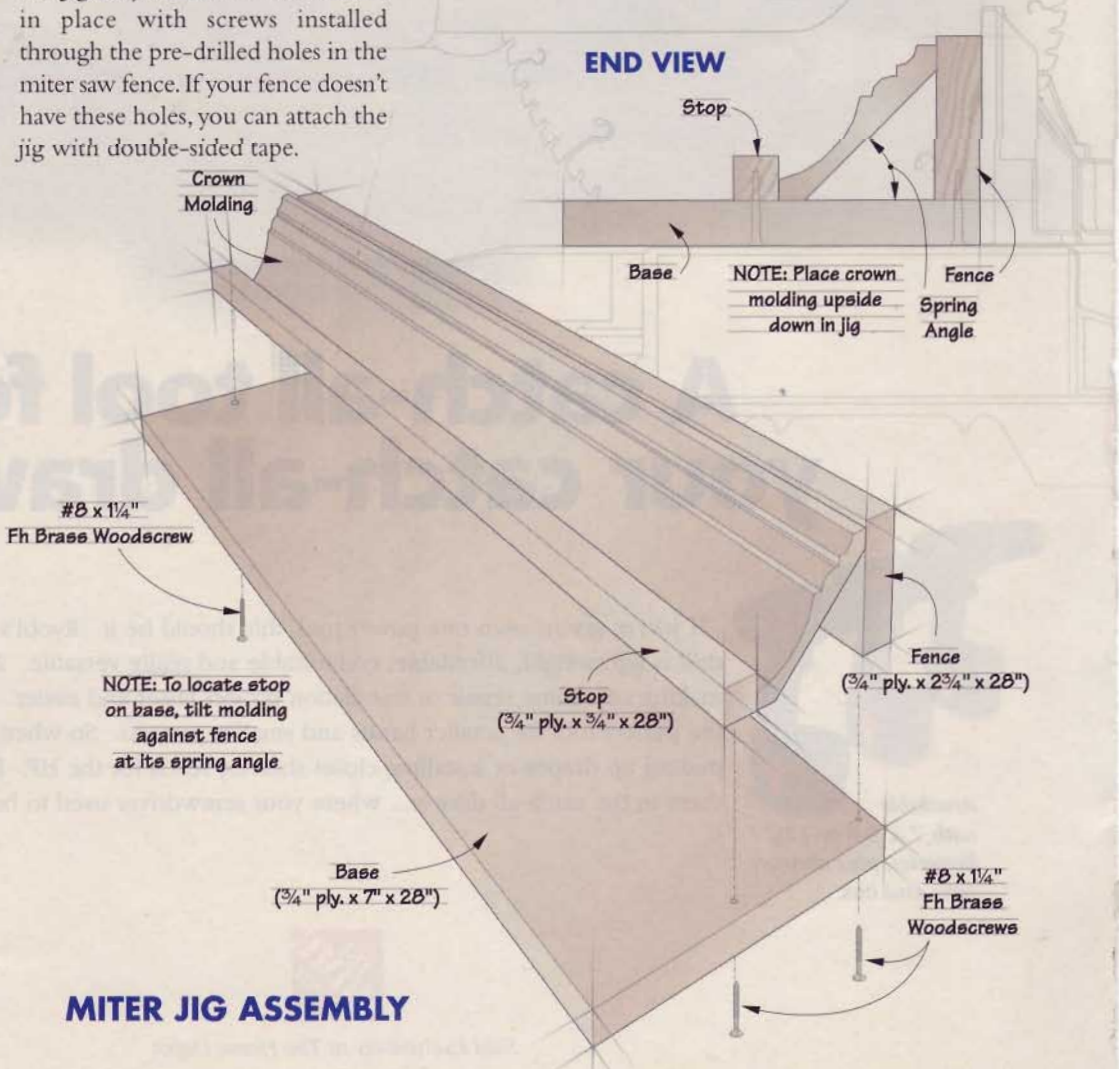
After cutting the pieces to size, the base and fence are simply screwed together, forming an L-shaped assembly.

Install the Stop — Now it's just a matter of attaching the stop. An easy way to determine the location of the stop is to use a scrap piece of crown molding. Lean the molding up against the fence. It should be placed upside down — that is, with the top of the molding against the base and the bottom against the fence.

Check that it's resting on the narrow edges (or "flats") on the back of the molding. Then mark the location of the bottom edge of the molding on the base of the jig. Now align the stop with the layout line and attach it with screws. (Later, if you're working with different-width crown molding, the stop can be easily repositioned.)

Mount the Jig — With the stop in place, it's just a matter of mounting the jig to your miter saw. It's held in place with screws installed through the pre-drilled holes in the miter saw fence. If your fence doesn't have these holes, you can attach the jig with double-sided tape.

▲ A stop attached to the base of this jig prevents the crown molding from slipping off its spring angle, so you can focus on making simple 45° miter cuts.



TIPS FROM THE WORKBENCH SHOP

simple blocks

SQUARE UP CASES

A butt joint may be the simplest of woodworking joints, but it still has one inherent problem — keeping panels aligned and square to one another during assembly.

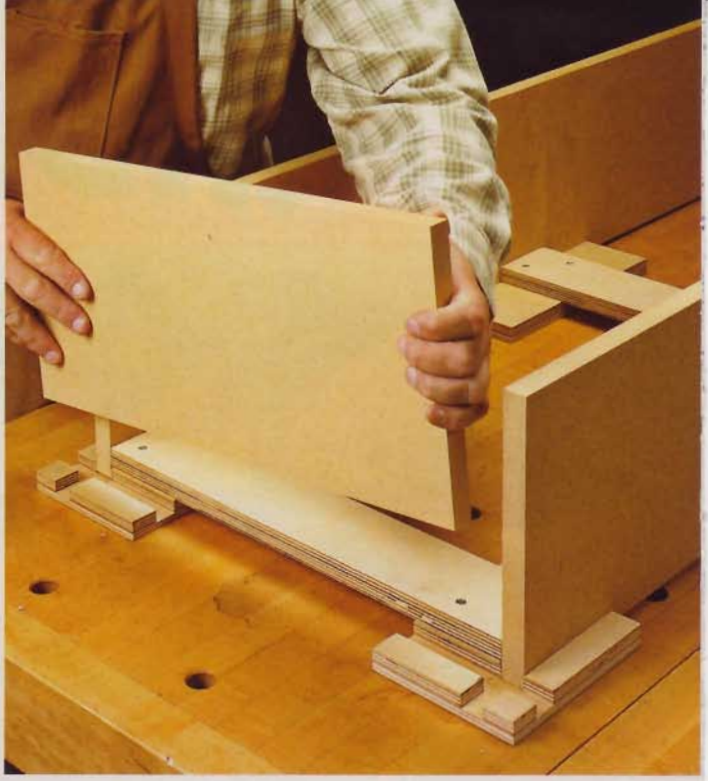
Assembly Blocks — For the bookcases on page 50, I used assembly blocks to keep the sides, top, and bottom panels of each case square as I screwed them together. I built two pairs of corner blocks for squaring the case, and a couple of support blocks to prop up the side panels during assembly.

The blocks all have grooves for the case panels to rest in. Each corner block has two intersecting grooves to hold the top or bottom and one side panel. The support blocks each have one groove to accept a side panel.

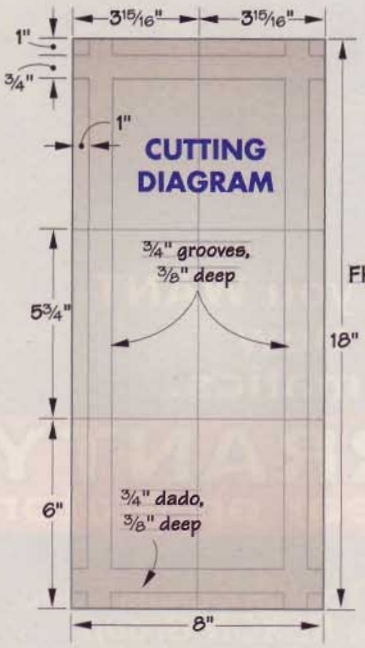
The *Cutting Diagram,* below, shows an easy way to lay out and cut all the blocks from a single piece of plywood. Be sure to cut the grooves before cutting the blocks to size.

Spacers — Each pair of blocks is screwed to a spacer. To ensure proper alignment of the panels, these spacers must be cut to the exact inside width of the case. **Note:** If you'll be assembling cases of differing widths, you can use the same assembly blocks and simply make new spacers.

Using the Blocks — The basic idea is to use the blocks to assemble one end of the case, then the other. To do this, set the corner and support blocks on a benchtop, and place the case panels in the grooves *(Photo).* Then, use the second set of corner blocks to "sandwich" the top and side panels between them. Drive screws into the top panel of the case. Repeat the process for the case bottom.



▲ Intersecting grooves in these blocks hold panels square to one another during case assembly. A spacer ensures a consistent width at the top and bottom of case.



space-saving MITER SAW STAND

▲ The extension wing on this miter saw stand provides sturdy support for long boards, then it folds for compact storage.

Most miter saws don't come equipped with a side support for cutting long boards, so Steven Sampson of Willoraham, MA, came up with a simple solution for his saw — a compact miter saw stand, which sits on a mobile tool chest. It features an extension wing that folds out to support long boards. A two-part leg lets you adjust the wing for uneven surfaces. Once a job is done, the leg and wing fold for storage *(Inset Photo)*.

This miter saw stand is designed with a sturdy platform that's used to mount the miter saw and extension wing. It consists of a base, top, riser, and a fixed table *(Platform Assembly)*.

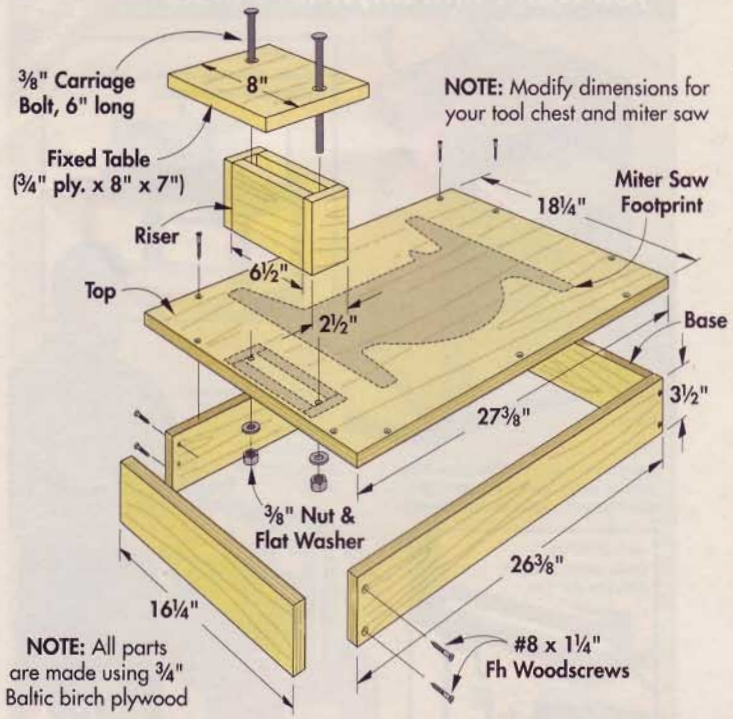
Sizing Considerations — The base is sized to fit inside the lip of the tool chest, and the top is $\frac{1}{2}$" wider and longer than the base. (For large saws, you may have to make it bigger to accommodate both the saw and the riser.) The riser, which is just a four-sided box that's open on top and bottom, must be tall enough so when you attach the fixed table, it will be flush with the metal table on the miter saw *(Front View)*.

The fixed table is secured to the top of the platform with bolts that pass through the opening in the riser. To locate the holes for the bolts, you'll need to position the riser, fixed table, and miter saw on the platform.

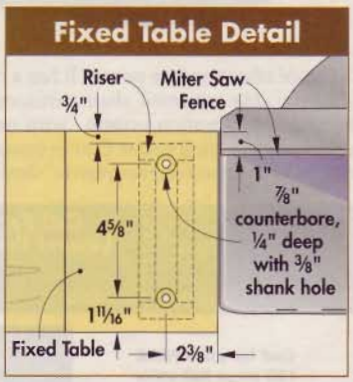
The riser is set in $\frac{1}{4}$" from the end of the platform. Its front-to-back position depends on the location of your miter saw, so you'll need to get the saw situated first.

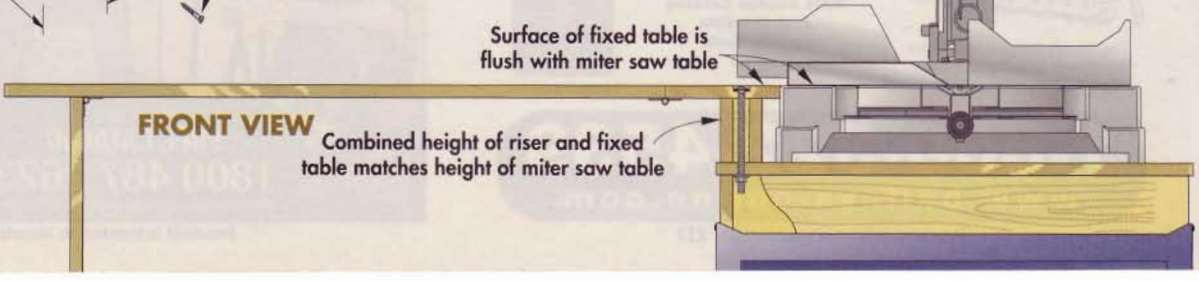
Once that's done, set the fixed table on the riser, and butt it against the miter saw *(Fixed Table Detail)*. Note how it extends 1" behind the front face of the miter saw fence. Now mark and drill the holes for the bolts in the fixed table. Use those holes as a guide to locate and drill bolt holes in the top. Then secure the riser and fixed table and screw the top to the base.

PLATFORM ASSEMBLY



Fixed Table Detail

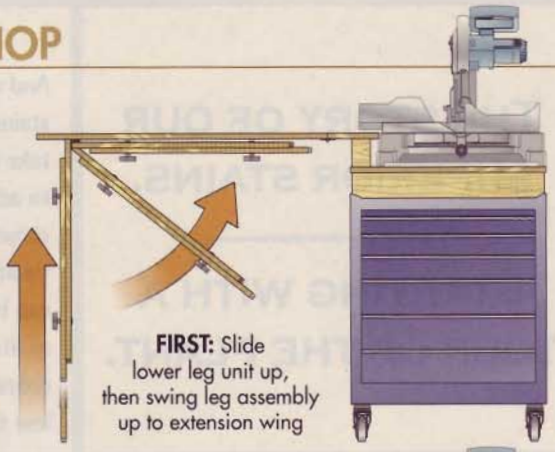


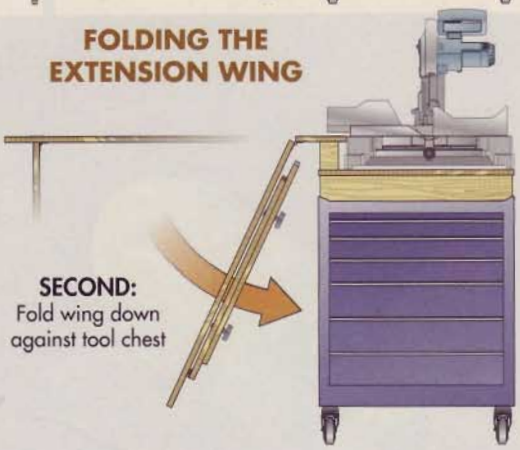


folding wing

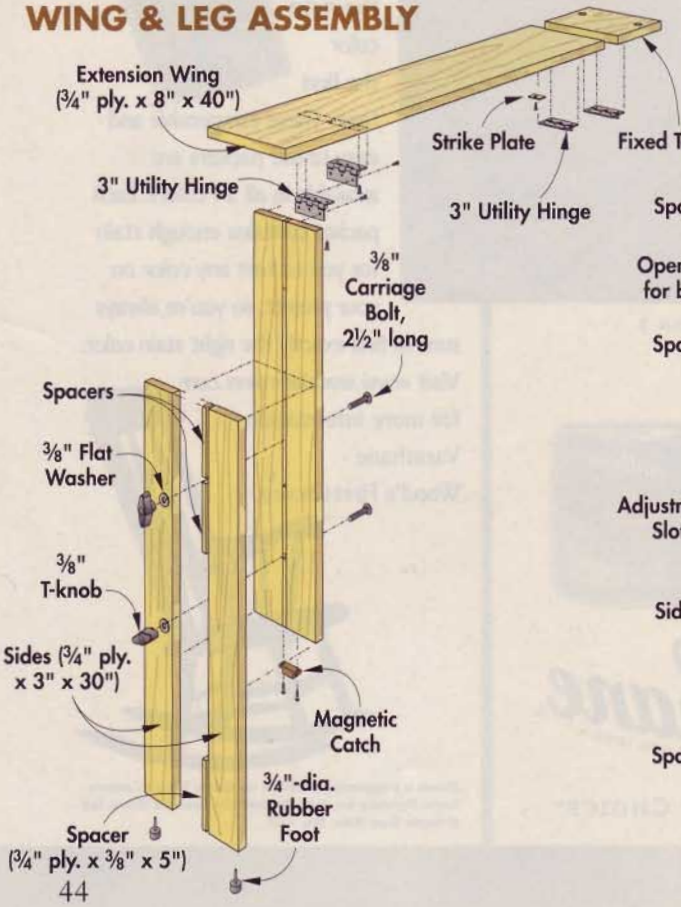
▲ The locking knobs and long slots in this two-part leg allow you to quickly adjust the height of the extension wing.

FOLDING THE EXTENSION WING

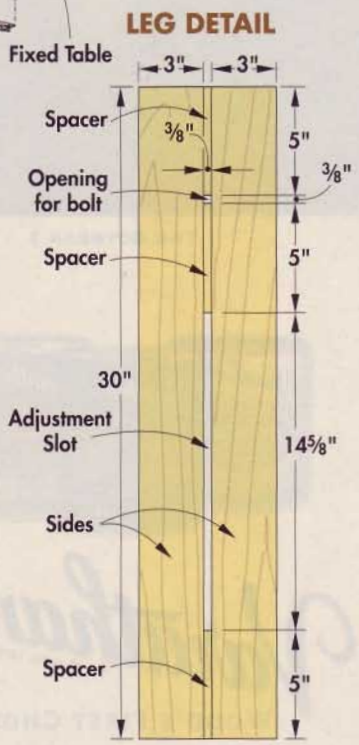




WING & LEG ASSEMBLY



LEG DETAIL



What makes this miter saw stand so versatile is the extension wing that provides support for long boards. The wing is hinged to the fixed table on the base assembly *(see Illustrations at left)*. A two-part leg, which is in turn hinged to the wing, adjusts to hold the wing level *(Photo, left)*.

Extension Wing — There's nothing complicated about the extension wing. It's just a piece of ¾" plywood (Baltic birch) that's attached to the fixed table with a pair of utility hinges *(see Wing & Leg Assembly Illustration below)*.

Adjustable Leg — To make the leg adjustable, it consists of two identical leg units, each one with a long slot running down the center. A small square opening in each leg unit accepts a carriage bolt, which is part of the locking mechanism for the leg. This opening captures the bolt so it won't fall to the bottom of the slot when you make an adjustment.

To form both the square opening and the adjustment slot, each leg unit is made up of three plywood spacers that are sandwiched between two plywood sides. Simply align the spacers as shown in the *Leg Detail*, and then glue and clamp each leg unit together.

Assembly — At this point, you should have two completed leg units that are exactly the same. Although the units are identical, they need to be oriented in opposite directions to make the leg adjustable. Notice that the opening for the carriage bolt in the inner leg unit (the one that's hinged to the wing) is toward the bottom, while the opening in the outer leg unit is near the top. This way, each bolt passes through one of the square openings and one adjustment slot.

With that in mind, hinge the inner leg unit to the extension wing. Then connect the two leg units with the bolts, washers, and knobs. Finally, add a magnetic catch and strike to hold the leg when you fold it for storage.

TOOL Close-Up

Dremel 400 XPR ROTARY TOOL

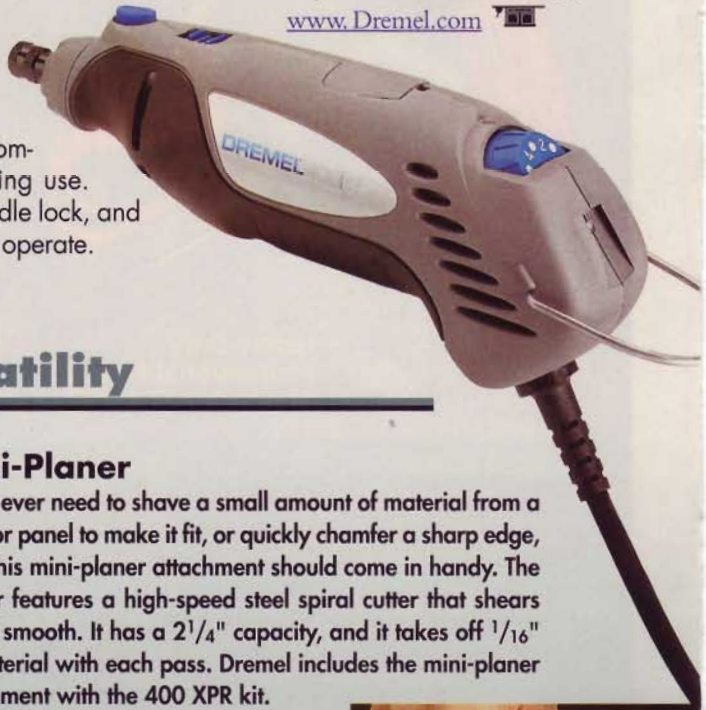
If you have a rotary tool in your shop, chances are it remains on the benchtop, waiting patiently for that occasional carving or sanding project.

Dremel hopes to bring the rotary tool into a more useful role in your home with its new 400 XPR, an improved version of its standard rotary tool. Among the 400 XPR's numerous upgrades are a more powerful permanent magnet motor and an ergonomic design.

The XPR comes in a handy storage case along with 71 classic rotary tool accessories and a few new offerings, such as a mini-planer and multi-saw attachment that help the Dremel cross over as a DIY tool *(see Boxes below)*. The kit sells for $99 and features a five-year warranty. For information, call 800-437-3635 or visit www.Dremel.com

▲ MORE POWER
The Dremel 400 XPR doesn't bog down during a tough cutting job like my old rotary tool used to. This is due in large to a new permanent magnet motor.

► IMPROVED DESIGN
The tool's new design fits comfortably in your hand during use. And the power switch, spindle lock, and speed dial are all easier to operate.



New Accessories Add More Versatility

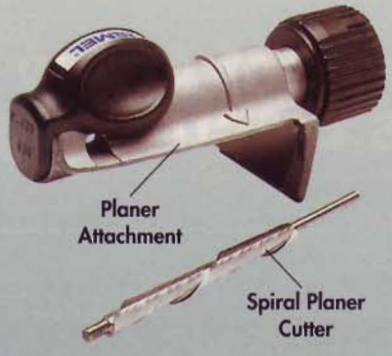
Multi-Saw

Part reciprocating saw, part jig saw, Dremel's new multi-saw attachment turns the Dremel 400 XPR into a useful cutting tool. The saw attachment screws easily onto the end of the rotary tool.

The multi-saw accepts both universal and T-shank jig saw blades and can cut through material up to 1 1/2" thick. The saw handles simple tasks like notching plywood and drywall or more involved jobs like intricate scroll cuts. It sells separately for $30.

Mini-Planer

If you ever need to shave a small amount of material from a door or panel to make it fit, or quickly chamfer a sharp edge, then this mini-planer attachment should come in handy. The planer features a high-speed steel spiral cutter that shears wood smooth. It has a 2 1/4" capacity, and it takes off 1/16" of material with each pass. Dremel includes the mini-planer attachment with the 400 XPR kit.



▲ By extending the collet above the tabletop, the Xtreme Xtension makes bit changes on a router table easy.

quick-change router bits
XTREME XTENSION

One of woodworking's great unanswered riddles is how to quickly and easily change a router bit in a table-mounted plunge router. This handy accessory from Router Technologies has the answer.

Collet Extension — The concept behind this Xtreme Xtension is simple enough. It's tightened into the router's existing collet, essentially becoming a second, longer collet. The extra length makes it easy to access the Xtension above a router table. Router bits are locked in place quickly and securely by tightening a set screw with an Allen wrench *(Photo, left)*.

Runout — One concern with *any* collet extension is runout, which will cause a bit to "wobble." Typically, runout is caused by the router's collet rather than the extension, but this runout can be aggravated by adding the extra length of an extension. So it's important to check for runout before putting the Xtreme Xtension to use for the first time.

Design Innovations — To stand up to the rigors of extended use, the Xtreme Xtension is made from a piece of fatigue-proof steel that's turned for a true surface. It locks the router bit in place by means of a steel wedge that applies clamping pressure onto the bit as you turn the set screw.

The Xtreme Xtension is sized for router bits with $\frac{1}{2}$" shanks, but it has a reduction sleeve for $\frac{1}{4}$" shanks. For more info, call 866-266-1293 or visit www.RouterTechnologies.com

fast, smooth cuts
"RAZOR" BLADES

The new Razor from Porter-Cable is one unusual-looking saw blade. On one section of the 10" blade, it looks like an 80-tooth finishing blade. But give it a quarter-turn, and the tooth spacing changes to a 24-tooth rip blade. Turn it some more, and you'll see that it changes to 40-tooth and then 60-tooth spacing.

Variable Spacing — Porter-Cable calls this unusual spacing its "variable-tooth design," which is available on $7\frac{1}{4}$", 10", and 12" blades. So what's the big deal about variable-tooth spacing? Porter-Cable claims it allows for a faster feed rate. And though I didn't put the blades up against every blade on the market, I can say that *all* the Razor blades allowed for an aggressive feed rate and produced crisp, clean cuts.

Tale of the Teeth — As I used the Razor blades, it was obvious some real thought went into this tooth spacing. The large gullets between the widely spaced teeth clear chips and dust quickly, allowing for faster cuts. The closely spaced teeth produce smooth, clean cuts.

Other features of the Razor blades include flattened, laser-cut plates for more strength and less deflection, and a thin-kerf design for less wood displacement. The blades range in price from $10 to $60. Check out www.Porter-Cable.com or call 800-487-8665 for information.


Van Gogh
STUART WOODS
Built to Hand
EICHLER

built-in BOOKCASES

If you judge this bookcase by its cover, the words "complex and costly" might come to mind. But simple construction and just $350 worth of materials provide the surprise ending in this tale of a room reborn as a library.

Most bookcases and display shelves are placed in a room wherever they fit. In this project, however, the bookcase *is* the room — or at least one wall of it.

The nice thing about a project like this is that it takes advantage of an enormous amount of wall space that typically goes unused. Just look at all the books and knick-knacks on this shelf, yet nothing seems crowded or squeezed in.

A less obvious advantage of this bookcase is how incredibly simple it is to build and install. All of the casework is built using butt joints and screws. The shelves, all of which are adjustable, rest on shelf pins that snap into metal standards. To keep the size of the project manageable, the bookcase is built in sections that are tied together as they're installed. The finishing touches are equally simple. A bit of crown molding, a touch of trim, and a coat of paint complete the picture.

Of course, this simple styling does more than just keep down the complexity and cost of the project. It also ensures that the items these shelves hold — not the shelves themselves — are on display.

Modular Construction >>>

To make it easy to adapt this project to fit any room, it's designed to be built and installed as a group of individual modules. There are three types of components: the bookcases (three wide units and a narrow one), bases to support the bookcases, and a door surround. Trim pieces tie all these elements together for an integrated look.

BOOKCASES

The bookcases are simply tall boxes made of $^3/_4$" medium-density fiberboard (MDF). For this room, we built three 30"-wide cases and an 18"-wide unit. Assembled with butt joints and screws, the cases are set side by side and screwed together, creating a thick vertical line as a visual element between units. Adjustable shelves, also made of MDF, are edged with wide bands of hardwood to prevent sagging.

DOOR SURROUND

The door surround is an inverted U-shaped unit that straddles the door opening. Here again, the sides of the surround butt against the bookcases, carrying the vertical design element across the row of bookcases. A single fixed shelf adds rigidity.

BASES

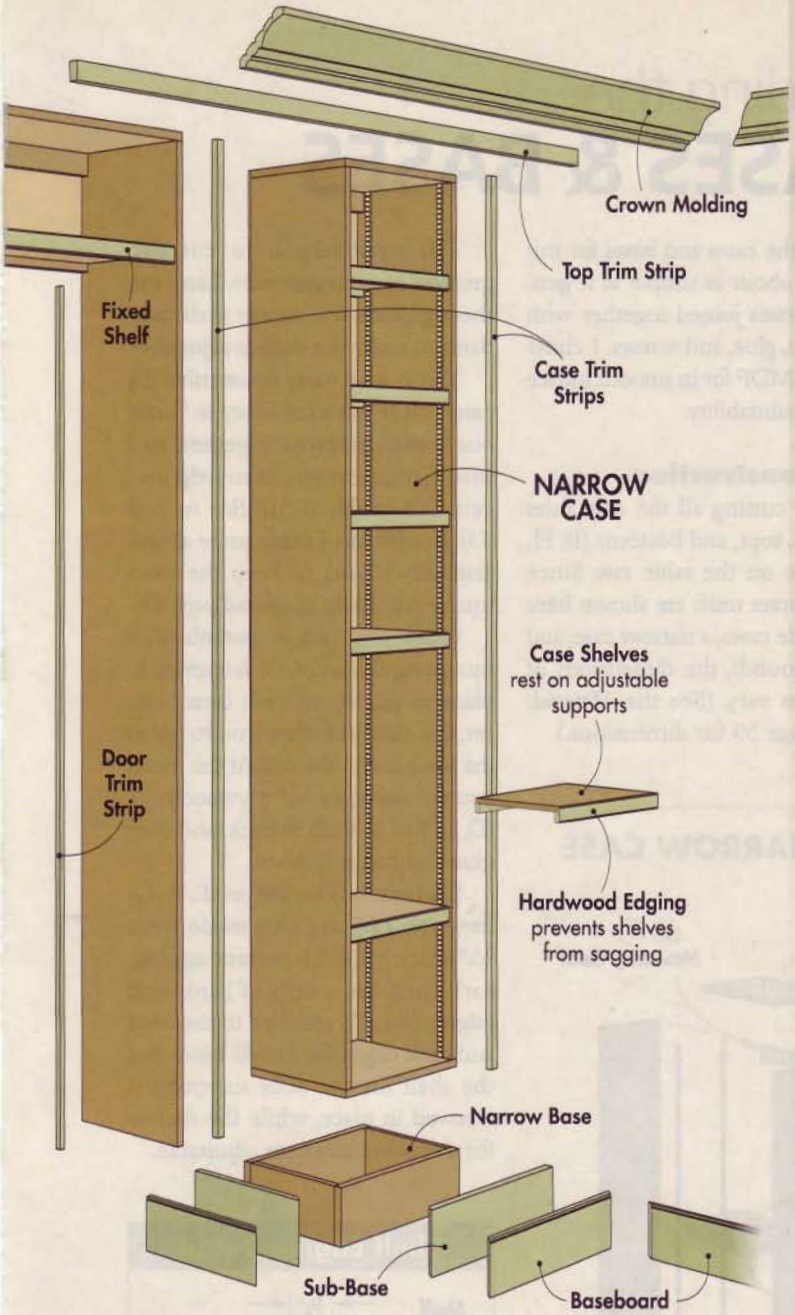
Simple base units elevate the cases off the floor. Made of MDF and assembled with butt joints and screws, the bases are secured to the wall. The bookcases are fastened to the bases with nails.

TRIM DETAILS

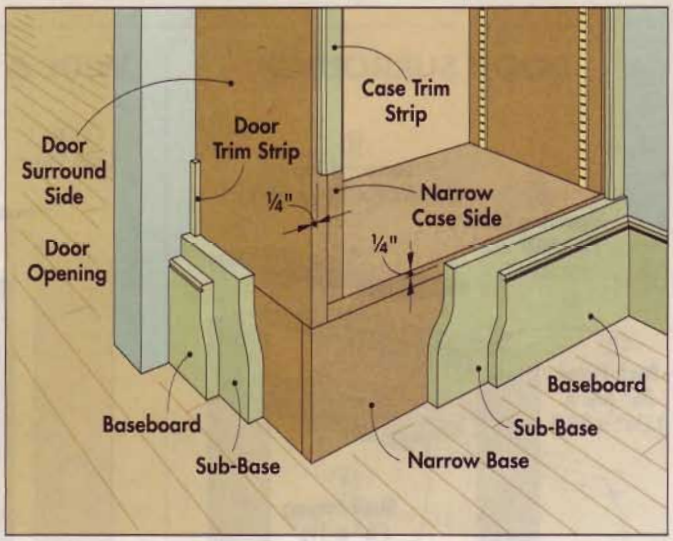
It's the hardwood trim that distinguishes this project, visually tying all the elements together *(see Trim Details on page 53)*. Made of economical poplar, the trim pieces are nailed in place as shown, then painted along with the bookcases.

SIZING GUIDELINES

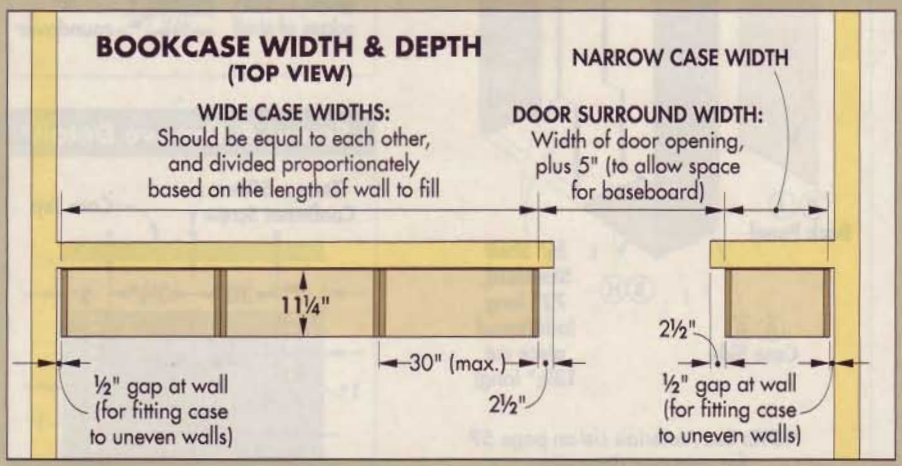
Built-in furniture is just that — furniture that's built to fit an existing room. To customize these bookcases to fit your room, consult the *Sizing Guidelines* on page 53. In addition, be sure to check out our online "Interactive Materials List" at www.WorkbenchMagazine.com. Just plug in the dimensions of your wall, and our exclusive program creates a materials list customized for your space.

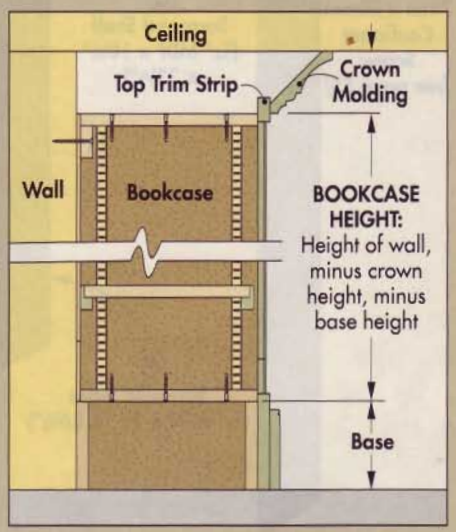


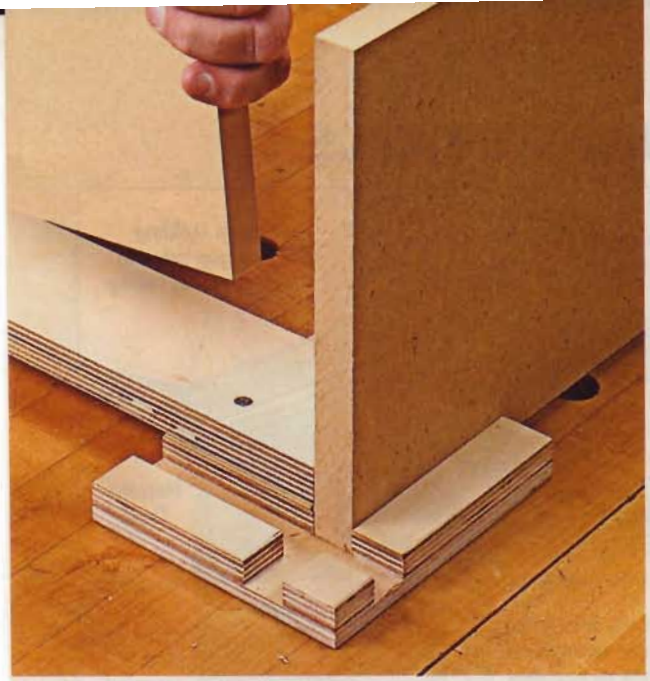
TRIM DETAILS



SIZING GUIDELINES







▲ Shop-made assembly blocks with intersecting grooves automatically square up the bookcases during assembly. To make the blocks, see page 38.

building the CASES & BASES

Building the cases and bases for this project is about as simple as it gets. They're boxes joined together with butt joints, glue, and screws. I chose 3/4"-thick MDF for its smooth surface and easy paintability.

Case Construction

Begin by cutting all the case sides (A, G, M), tops, and bottoms (B, H, N) to size on the table saw. Since three separate units are shown here (three wide cases, a narrow case, and door surround), the dimensions of these parts vary. (See the *Materials List* on page 59 for dimensions.)

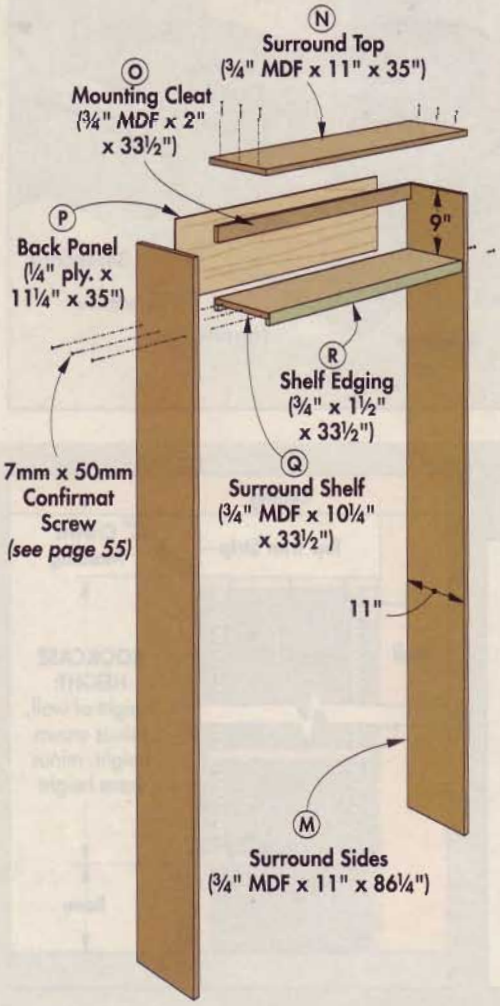
The next step is to cut two grooves in each case side. Later on, these grooves will accept shelf standards to make the shelves adjustable.

You're now ready to assemble the cases. MDF has a tendency to "blow out" when screwed together, so I used Confirmat screws to help prevent this problem *(see Box on page 55)*. In addition, I made some simple assembly blocks to keep the cases square *(see Photo at left and page 38)*.

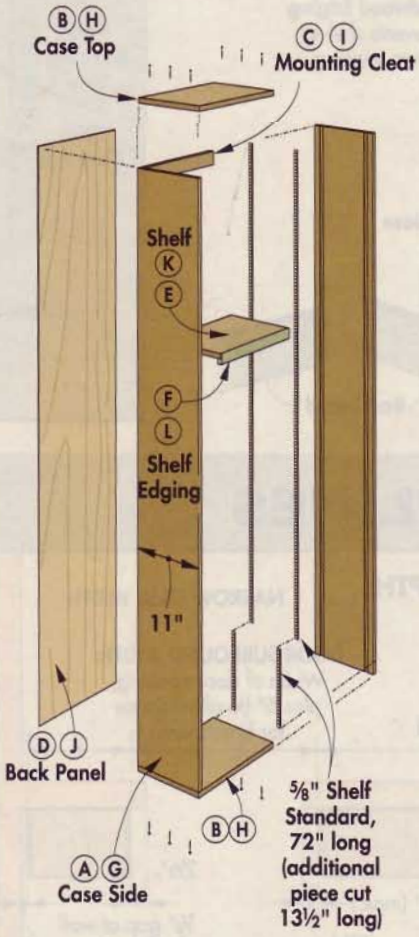
Once the case is assembled, a mounting cleat (C, I, O) is screwed in place at the top of each case. Later on, this cleat will allow you to fasten the bookcase to the wall. At this point, you can also cut a 1/4" plywood back (D, J, P) to fit flush in back, and then glue and nail it in place.

Shelves — The shelves (E, K, Q) for each case are also made from 3/4"-thick MDF. To prevent sagging, each shelf has a strip of hardwood edging (F, L, R) attached to the front and back edges *(see Detail)*. Note that the shelf for the door surround is screwed in place, while the shelves for the other cases are adjustable.

DOOR SURROUND

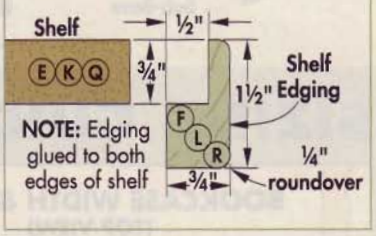


WIDE & NARROW CASE

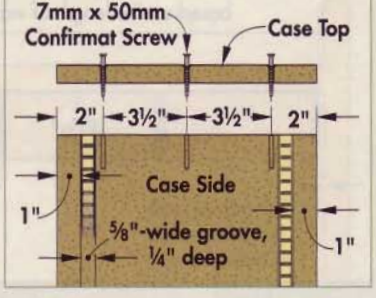


NOTE: See *Materials List* on page 59 for case part dimensions

Shelf Edging Detail



Screw & Groove Detail



Base Construction

When installed on the wall, the bookcases sit on a pair of bases, which also are built from 3/4" MDF.

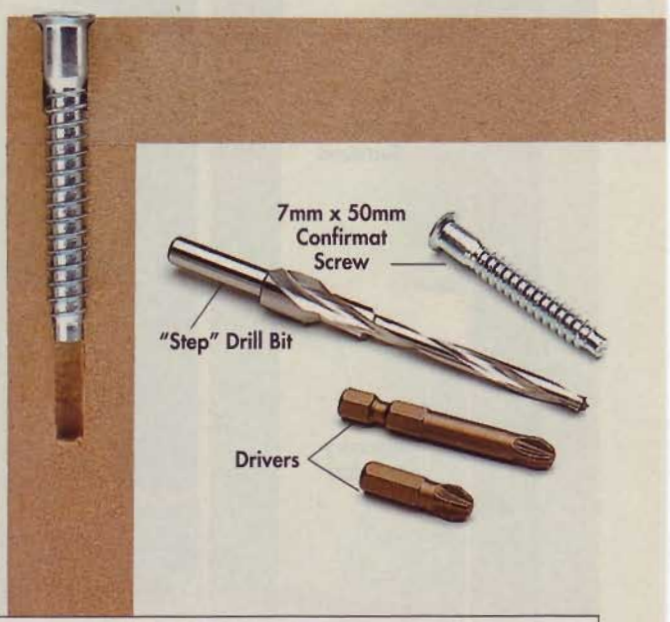
Sizing Considerations — While both bases match the depth of the bookcases that mount above them, note that they are 3/4" longer than the span of cases they will support. This leaves a 3/4" lip to support the bottom end of the door surround *(Base Detail)*.

Base Assembly — After cutting the fronts, backs (S,T), and supports (U) to size on the table saw, assembling the two base units is as easy as gluing and screwing them together. But first, position the inner supports so they sit underneath the joint between two cases.

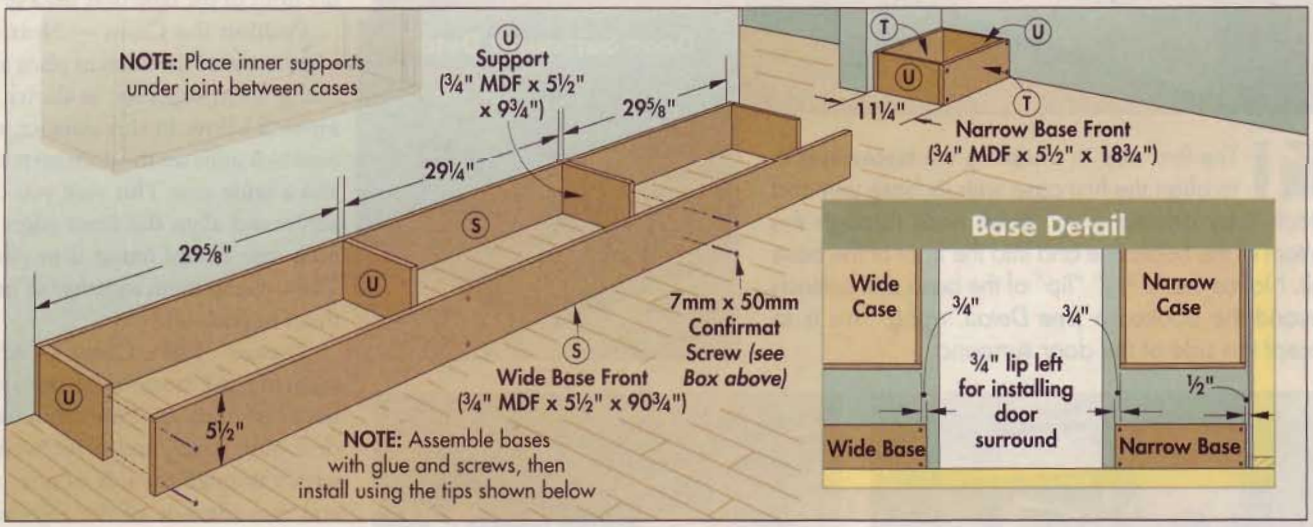
Once the frames are assembled, install them as shown below.

Confirmat Screws

When assembling these MDF bookcases, I used some special fasteners called Confirmat screws. The straight shanks of these screws won't split MDF like standard tapered woodscrews. And a large shoulder directly beneath the screw head locks the shank in position, minimizing the possibility of board failure. For 3/4" material, 7mm x 50mm screws are recommended. The screws are available in a kit at www.McFeelys.com or by calling 800-443-7937. (Kit No. 7050-CSP-A)



BASE ASSEMBLY & INSTALLATION

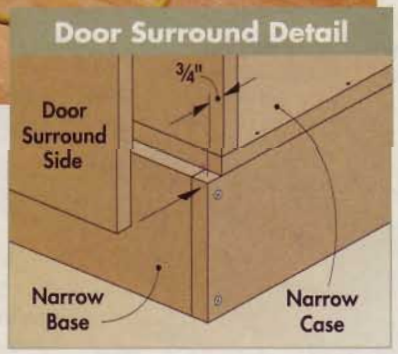


1 Set the base against the wall, and check it for level. Use shims to level if necessary.

2 Use a straightedge to align the front faces of the base units. Use shims to align if needed.

3 Once the bases are level and the front faces are aligned, screw them to the wall studs.

1 *The first step in installing the bookcases is* to align the first case with its base unit and attach it by driving $1\frac{1}{2}$" finish nails through the bottom of the bookcase and into the front of the base unit. Notice that a $\frac{3}{4}$" "lip" of the base unit extends beyond the bookcase *(see Detail, right)*. This is to accept the side of the door surround.



2 After aligning and clamping two more cases, fasten them to each other by screwing through the side of one case and into the adjoining case.

3 Finally, attach each bookcase to the wall by driving woodscrews through the mounting cleat and into the wall studs behind it. Shim if necessary.

install the CASES

With the base units firmly in place against the wall, you can now begin attaching the bookcases themselves to these bases.

Align, Then Nail — But before running any nails or screws, it's best to set the first bookcase in place and get it aligned just how you want it on the base unit. In this instance, the narrow case was the first to be installed. Be sure to align the case flush with the base where it meets the wall, leaving a $\frac{1}{2}$" gap between the case and the wall. This gap allows for any irregularities in the wall, and later on, a trim strip will cover the gap *(see Box on page 57)*.

Then, drive finish nails through the bottom of the bookcase and into the front of the base unit *(see Fig. 1)*.

Position the Cases — Next, set a few more of the cases in place and clamp them together, as shown in *Figure 2* below. In this instance, the next two units are the door surround and a wide case. This way, you can adjust and align the front edges of each case before fixing it in place. Then, clamp them together to hold them in position.

Secure the Cases — After securing the bottom of the next bookcase to the base unit with nails, drill pilot holes, and drive woodscrews through the side of one case and into the side of the adjoining case *(Fig. 2)*. There's no need to go overboard here — four or five screws ought to do the trick. And don't worry about the screw holes. They'll be filled and sanded before painting the cases.

Attach to Wall — Once the cases are attached to one another, the last step in securing the bookcases is to attach them to the wall. This is accomplished by drilling pilot holes and then driving woodscrews through the mounting cleat on each case and into the wall *(Fig. 3)*. Be sure to hit the wall studs to ensure a solid installation.

tie it together with

SOLID-WOOD TRIM

A few final trim pieces are what transform the bookcases into a great-looking project. First, a built-up baseboard lends a nice look to the bottom of the case *(Figs. 1 & 2)*. Then, top trim and crown molding are a perfect finish on top *(Fig. 3)*. And finally, trim strips cover the joint between each case, giving the bookcases a solid, thick appearance *(Fig. 4)*.

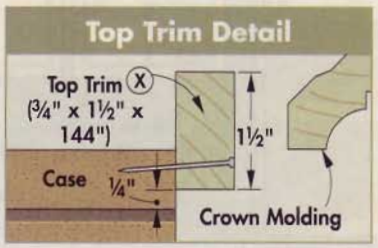
For more tips on installing crown molding, see page 60. And to finish the cases off with a perfect paint job, see page 22.

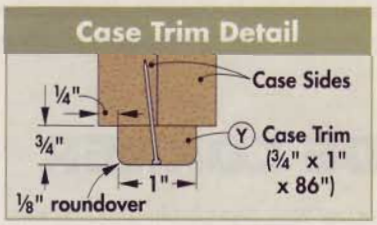
1 The first trim piece is a 6"-wide sub-base (V), which is mitered at the corners and nailed to the base.

2 Next, I nailed baseboard (W) that matched the room's trim (5" wide, with a beaded profile) to the sub-base.

3 After nailing a top trim strip (X) to the case tops, install crown molding above the bookcase *(see page 60)*.

4 Next, nail case trim strips (Y) in place. They are centered on the sides between each pair of cases.



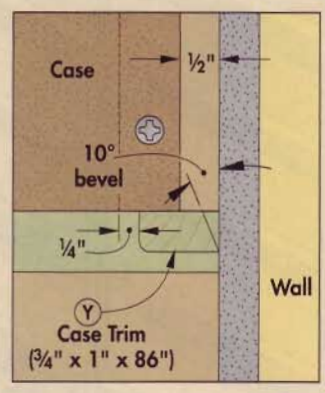


Scribing Trim

The trim strips at each end of these bookcases may not rest square and flush with the wall. This will require you to scribe and cut to fit.

One way to make scribing easier is to back-bevel the edge of the trim strip that adjoins the wall at 10° *(see Art, right)*. This way, you'll have a lot less material to cut through when you have to scribe and cut it later on.

To scribe the trim strip, first set it plumb with the wall. Then hold a pencil against the wall, and run it along the strip *(see Photo)*.



▲ Beveling the edge of the trim strip against the wall makes it easy to get a tight fit.

▲ To scribe the trim strip to the wall, hold it plumb and run a pencil along it. Then cut or sand to the line.

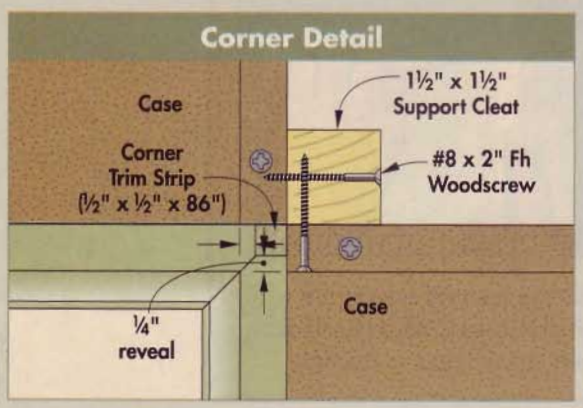
3 bookcase design OPTIONS

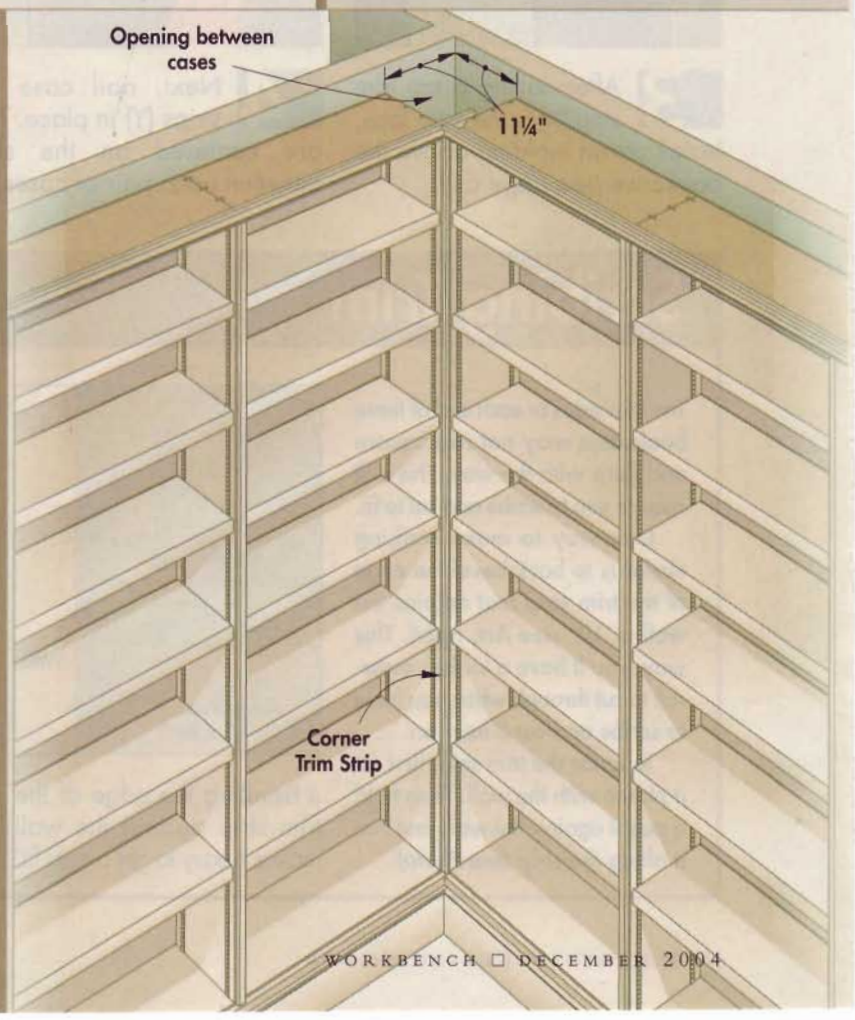
1) WINDOW

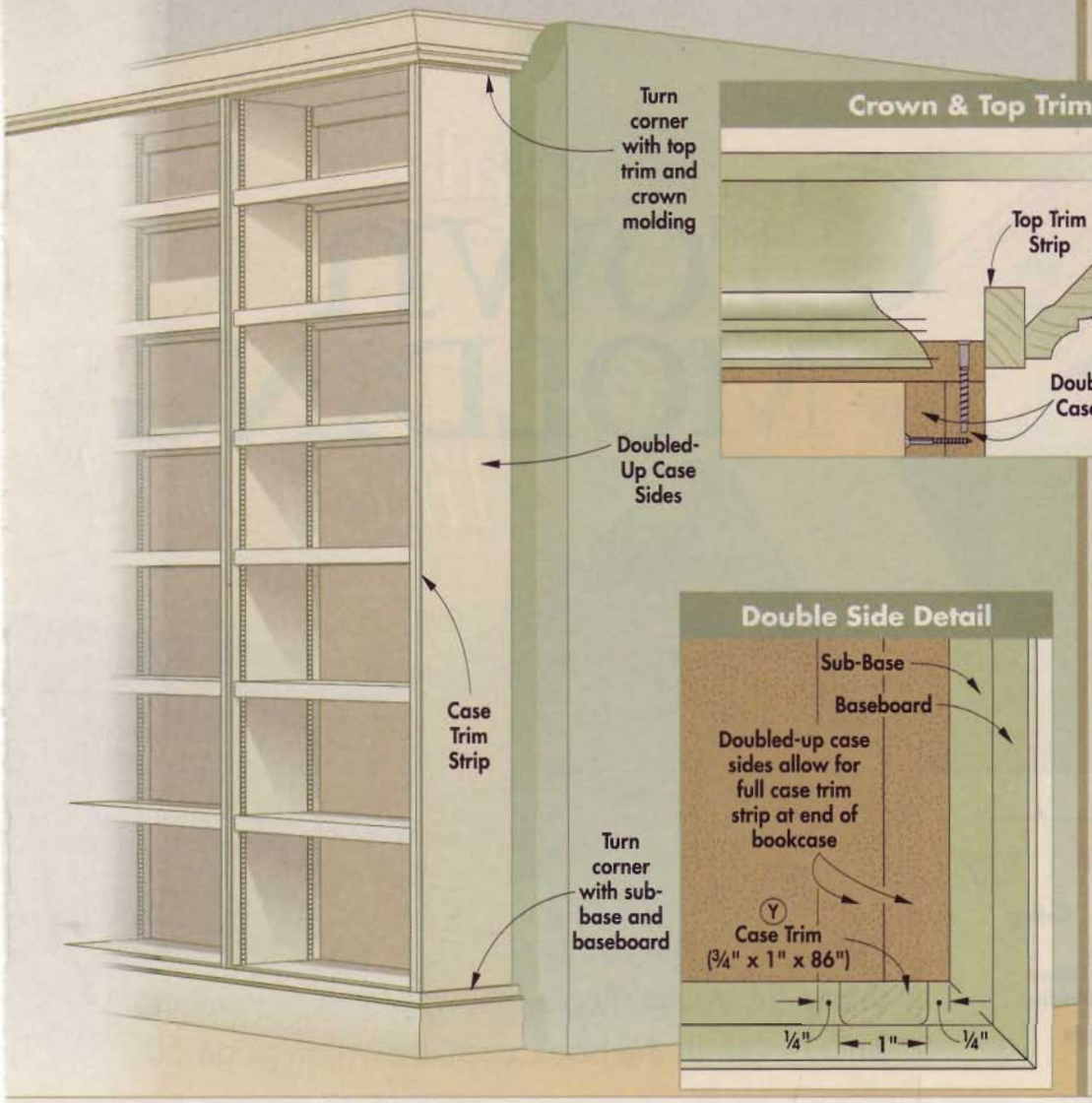
For wall-to-wall bookshelves that "wrap" around a window, you would design them similar to the bookcases shown in the article. But in this instance, the door surround instead becomes a window surround. Here, you simply adjust the width of the surround to be wider than the width of the window itself. Also note that baseboard is installed underneath the window to carry this design element to the other side of the surround.

2) INSIDE CORNER

To turn an inside corner with these built-in bookcases, you simply end the row of bookcases 11¼" (the depth of one bookcase) from the wall. This way, you can build and install the next case on the adjoining wall right next to the other bookcase. There are two considerations here, though. First, a support cleat screwed in place at the junction of the two cases adds stability. Second, a corner trim strip is nailed in place between the two cases to hide any gaps and create ¼" "reveals" in the corner *(see Corner Detail, below)*.







3) MIDWALL

If you'd like your bookcases to stop in the middle of a wall rather than span its entire width, that's easy to do. Here, just screw one extra case side to the exposed side of the bookcase, and cover the two pieces with another case trim strip *(see Detail, left)*. This helps reinforce the thick, sturdy look of the bookcase sides. You'll also need to make your base unit ¾" longer to accommodate this extra case side. And along these lines, the sub-base, baseboard, top trim strip, and crown molding all need to "turn the corner" in order to cover the exposed end of the case.

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
	Wide Cases					
A	Case Sides	6	¾"	11"	85½"	MDF
B	Case Tops & Bottoms	6	¾"	11"	30"	MDF
C	Mounting Cleats	3	¾"	2"	28½"	MDF
D	Back Panels	3	¼"	30"	87"	Birch Plywood
E	Shelves	18	¾"	10¼"	28⅜"	MDF
F	Shelf Edging	36	¾"	1½"	28⅜"	Poplar
	Narrow Case					
G	Case Sides	2	¾"	11"	85½"	MDF
H	Case Top & Bottom	2	¾"	11"	18"	MDF
I	Mounting Cleat	1	¾"	2"	16½"	MDF
J	Back Panel	1	¼"	18"	87"	Birch Plywood
K	Shelves	6	¾"	10¼"	16⅜"	MDF
L	Shelf Edging	12	¾"	1½"	16⅜"	Poplar
	Door Surround					
M	Surround Sides	2	¾"	11"	86¼"	MDF
N	Surround Top	1	¾"	11"	35"	MDF
O	Surround Cleat	1	¾"	2"	33½"	MDF
P	Back Panel	1	¼"	11¼"	35"	Birch Plywood
Q	Surround Shelf	1	¾"	10¼"	33½"	MDF
R	Shelf Edging	2	¾"	1½"	33½"	Poplar
	Base Units					
S	Wide Base Front/Back	2	¾"	5½"	90¾"	MDF
T	Narrow Base Front/Back	2	¾"	5½"	18¾"	MDF
U	Supports	6	¾"	5½"	9¾"	MDF
	Trim Pieces					
V	Sub-Base	1	¾"	6"	12'	Poplar
W	Baseboard	1	⅝"	5"	12'	Poplar
X	Top Trim	1	¾"	1½"	12'	Poplar
Y	Case Trim Strips	6	¾"	1"	86"	Poplar
Z	Door Trim Strips	2	½"	½"	75"	Poplar

- (20) ⅝" Shelf Standards (72" long) *
- (1) 7mm x 50mm Confirmat Screw Kit **
- (20) #8 x 1¼" Fh Woodscrews
- (30) #8 x 2½" Fh Woodscrews
- (200) 1½" Finish Nails

*Item #22096 at www.Rockler.com
** Item #7050-CSP-A at www.McFeelys.com

ONLINE Extras
Interactive Materials List
Cutting Diagram
WorkbenchMagazine.com

WORKBENCH®

BUILT-IN BOOKCASES

Issue 286 Volume 60 Number 6 November/December 2004

MATERIALS LIST

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
	Wide Cases					
A	Case Sides	6	¾"	11"	85½"	MDF
B	Case Tops & Bottoms	6	¾"	11"	30"	MDF
C	Mounting Cleats	3	¾"	2"	28½"	MDF
D	Back Panels	3	¼"	30"	87"	Birch Plywood
E	Shelves	18	¾"	10¼"	28⅜"	MDF
F	Shelf Edging	36	¾"	1½"	28⅜"	Poplar
	Narrow Case					
G	Case Sides	2	¾"	11"	85½"	MDF
H	Case Top & Bottom	2	¾"	11"	18"	MDF
I	Mounting Cleat	1	¾"	2"	16½"	MDF
J	Back Panel	1	¼"	18"	87"	Birch Plywood
K	Shelves	6	¾"	10¼"	16⅜"	MDF
L	Shelf Edging	12	¾"	1½"	16⅜"	Poplar
	Door Surround					
M	Surround Sides	2	¾"	11"	86¼"	MDF
N	Surround Top	1	¾"	11"	35"	MDF
O	Surround Cleat	1	¾"	2"	33½"	MDF
P	Back Panel	1	¼"	11¼"	35"	Birch Plywood
Q	Surround Shelf	1	¾"	10¼"	33½"	MDF
R	Shelf Edging	2	¾"	1½"	33½"	Poplar
	Base Units					
S	Wide Base Front/Back	2	¾"	5½"	90¾"	MDF
T	Narrow Base Front/Back	2	¾"	5½"	18¾"	MDF
U	Supports	6	¾"	5½"	9¾"	MDF
	Trim Pieces					
V	Sub-Base	1	¾"	6"	12'	Poplar
W	Baseboard	1	⅝"	5"	12'	Poplar
X	Top Trim	1	¾"	1½"	12'	Poplar
Y	Case Trim Strips	6	¾"	1"	86"	Poplar
Z	Door Trim Strips	2	½"	½"	75"	Poplar

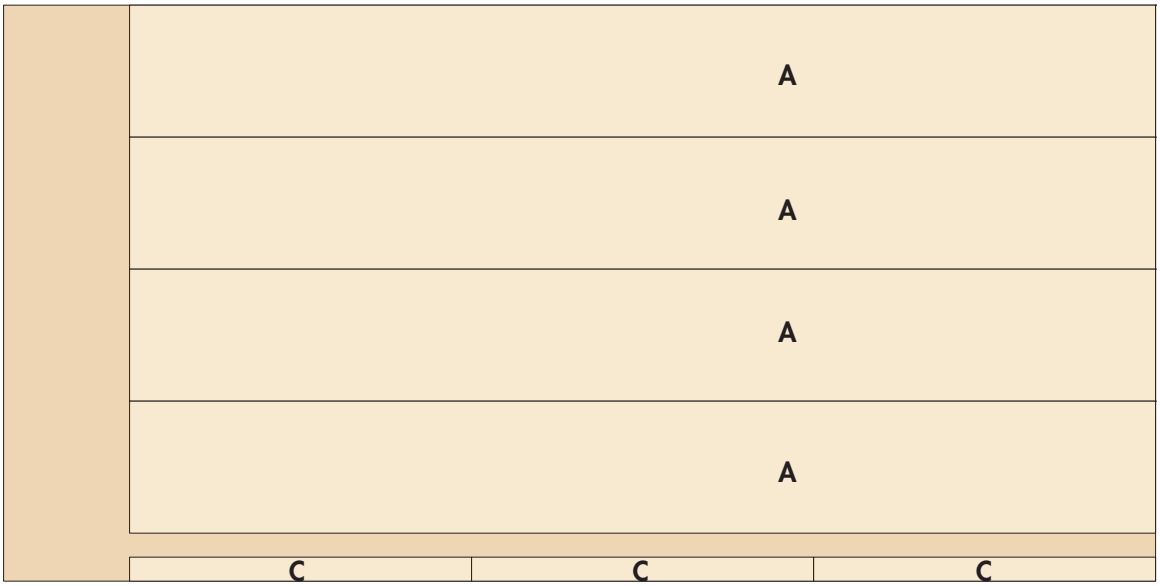
(20) ⅝" Shelf Standards (72" long) *
(1) 7mm x 50mm Confirmat Screw Kit **
(20) #8 x 1¼" Fh Woodscrews
(30) #8 x 2½" Fh Woodscrews
(200) 1½" Finish Nails

*Item #22096 at www.Rockler.com
** Item #7050-CSP-A at www.McFeelys.com

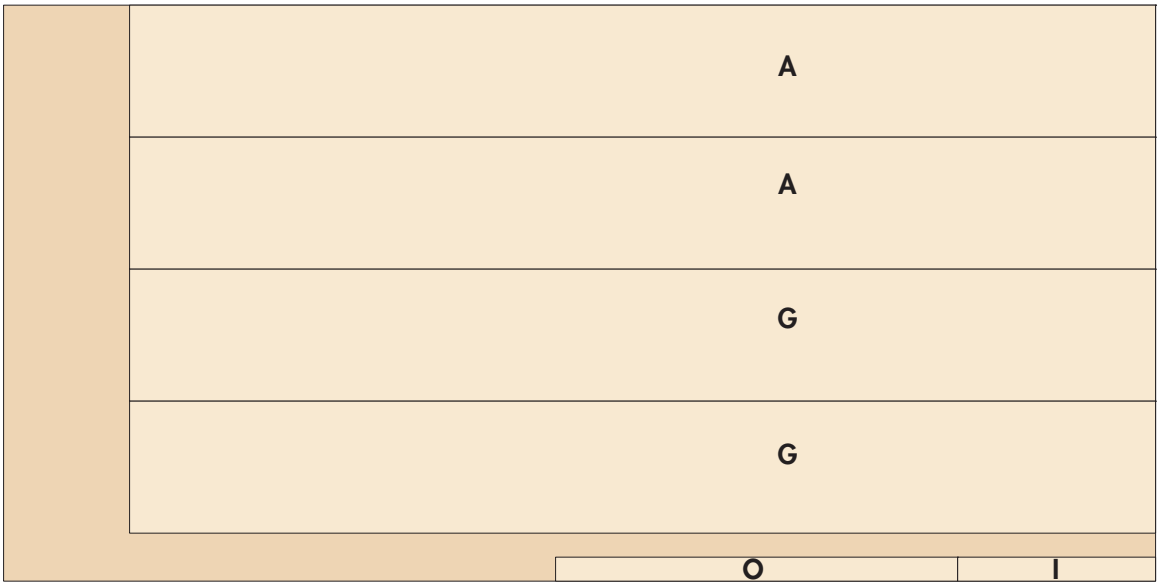
ONLINE Extras
Interactive Materials List
Cutting Diagram
WorkbenchMagazine.com

Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM



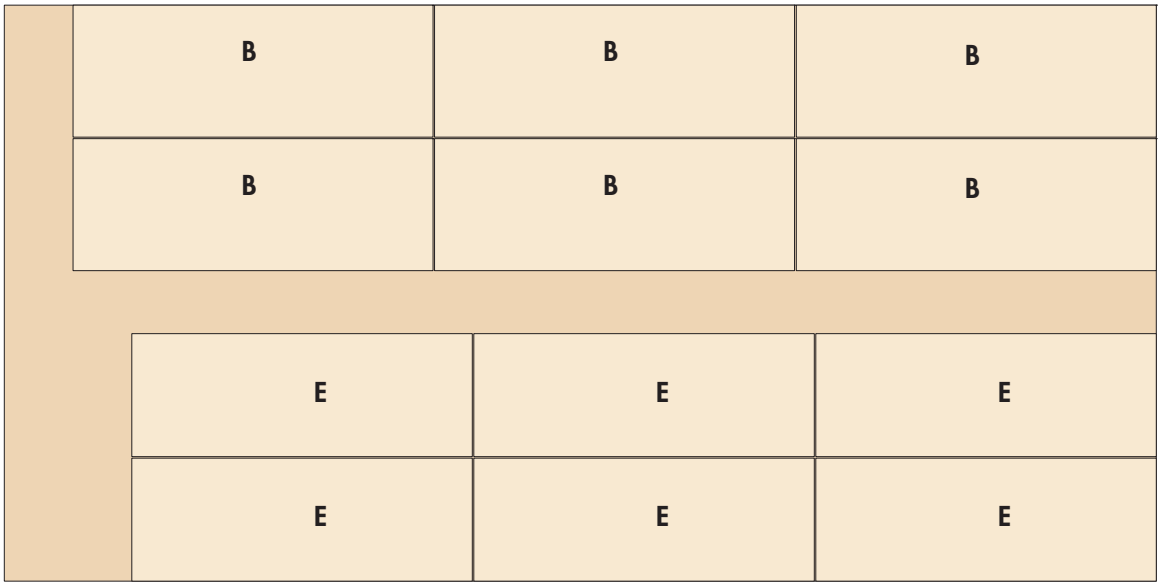
¾" x 49" x 97" MDF



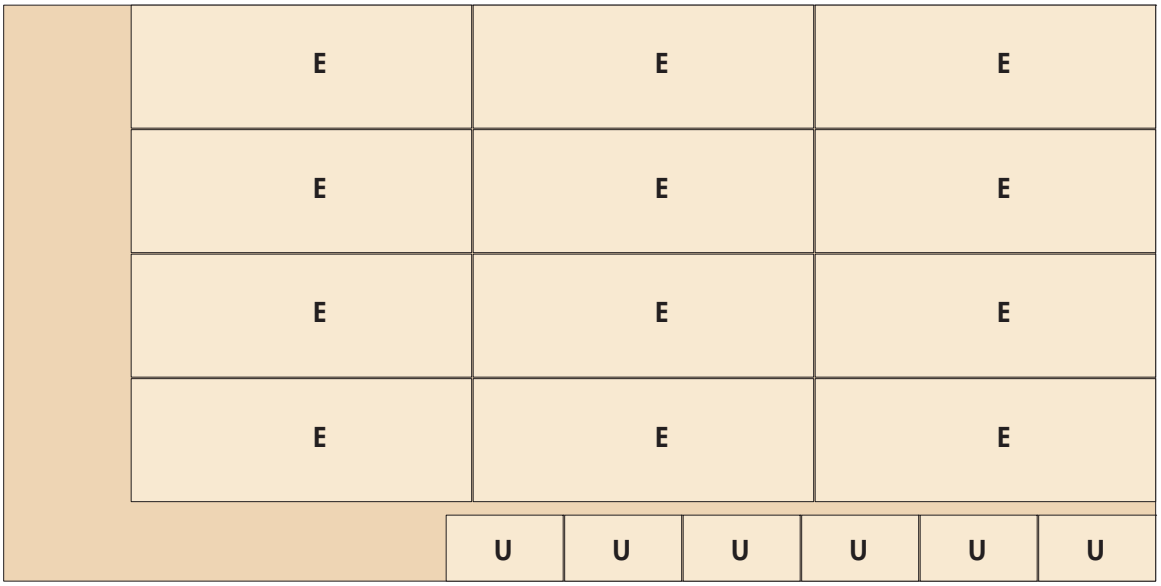
¾" x 49" x 97" MDF

Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM



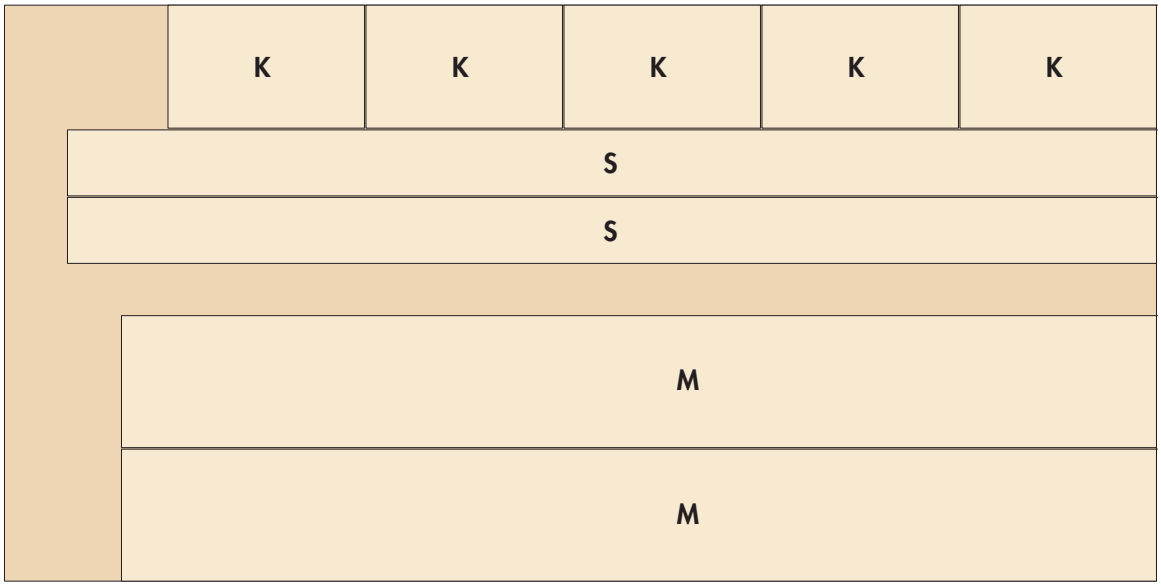
¾" x 49" x 97" MDF



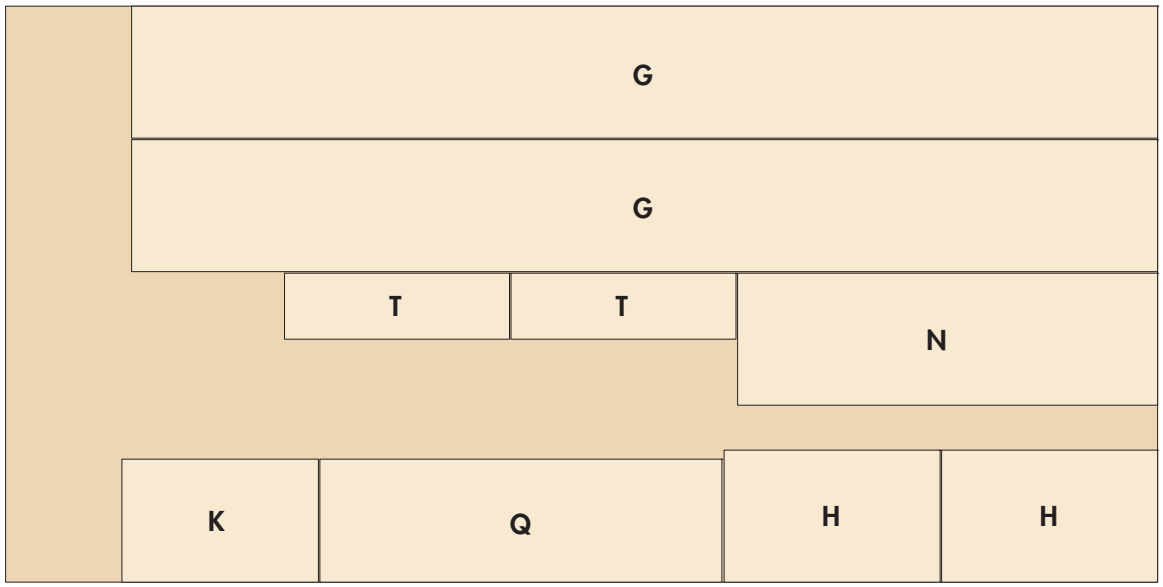
¾" x 49" x 97" MDF

Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM



¾" x 49" x 97" MDF

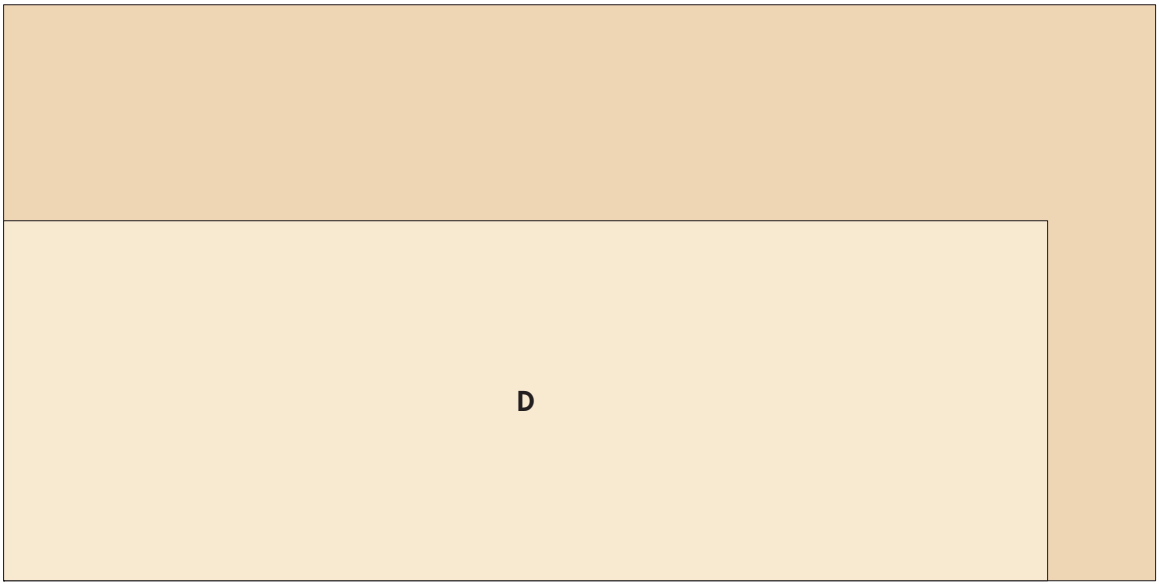


¾" x 49" x 97" MDF

Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM

¼" x 48" x 96" Birch Plywood

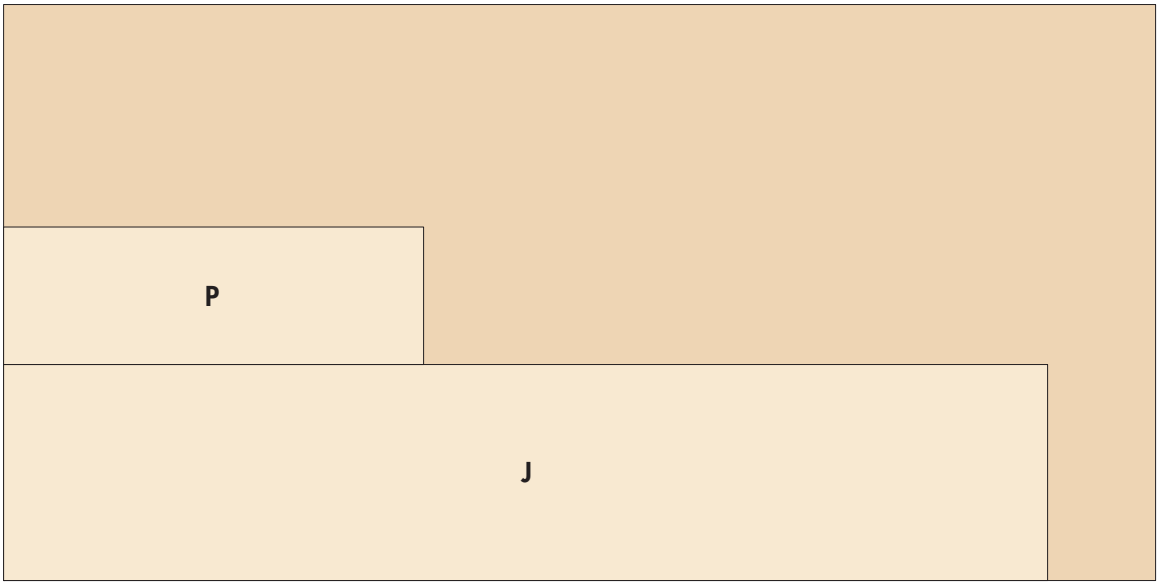


¼" x 48" x 96" Birch Plywood

Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM

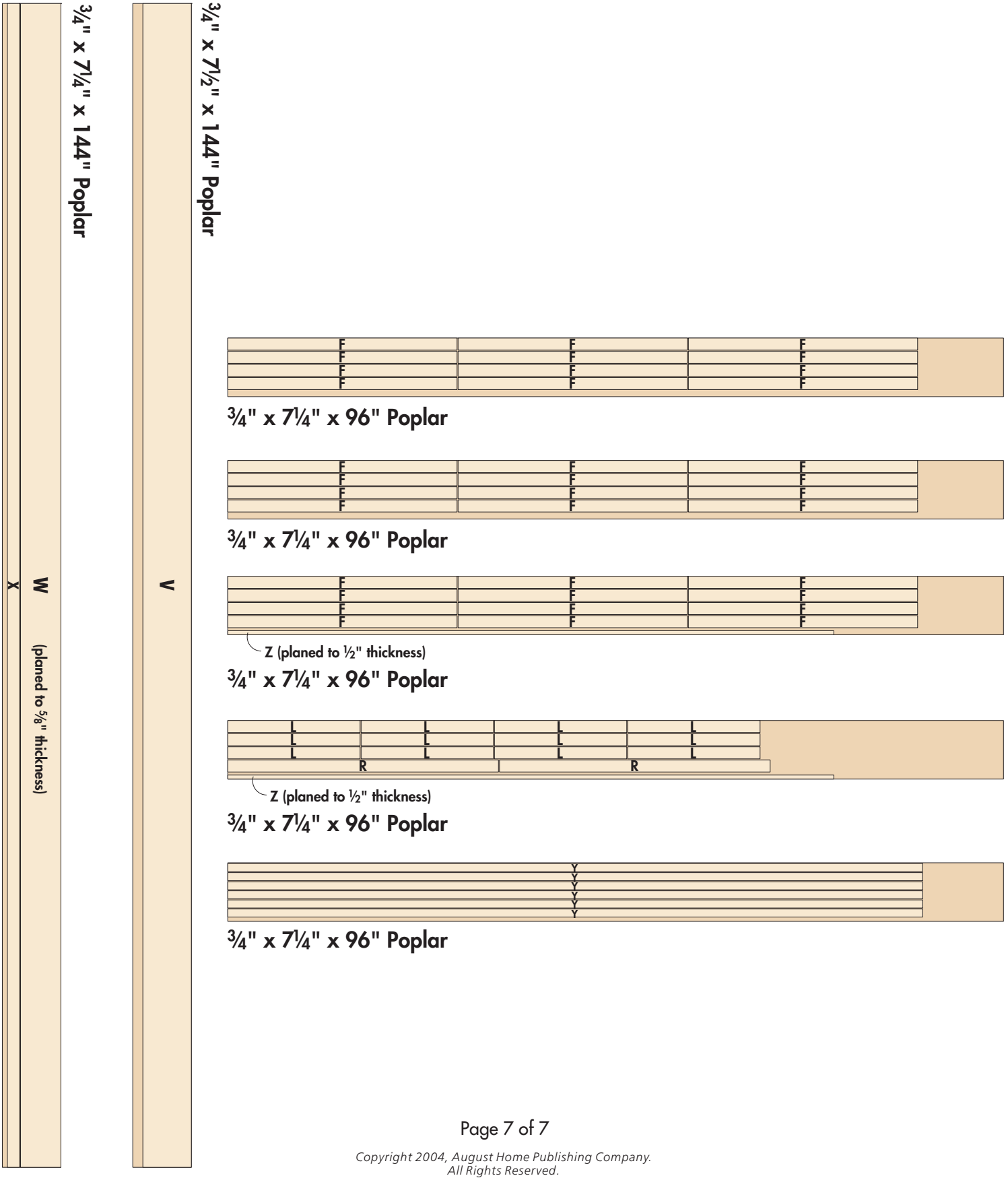
¼" x 48" x 96" Birch Plywood



¼" x 48" x 96" Birch Plywood

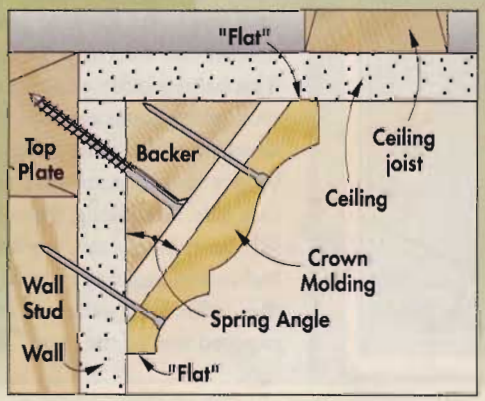
Issue 286 Volume 60 Number 6 November/December 2004

CUTTING DIAGRAM

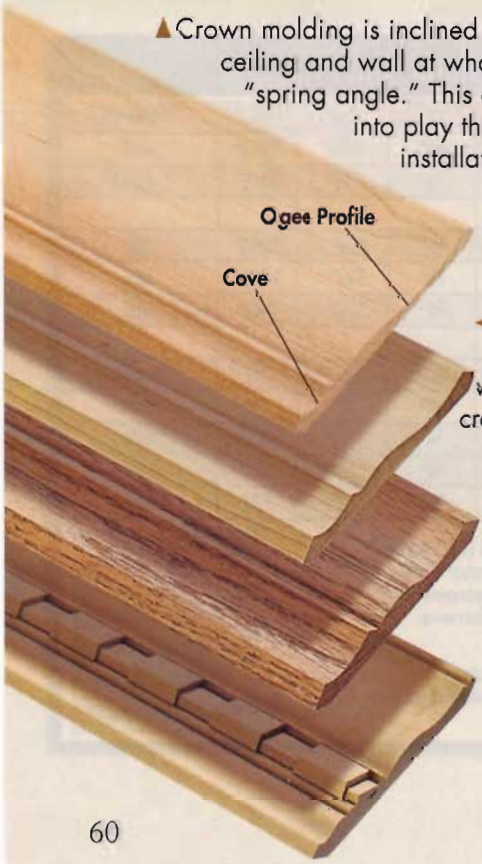


Skill Builder

install Crown MOLDING like a pro!



▲ Crown molding is inclined between the ceiling and wall at what's called its "spring angle." This angle comes into play throughout the installation process.



◀ Regardless of width or wood species, crown molding often has an ogee profile near the top edge and a cove at the bottom.

Here's everything you need to know to get perfect-fitting crown molding — whether you're trimming out a room or the bookcases shown on page 50.

As any seasoned carpenter will tell you, installing crown molding is anything but a routine task. Unlike most moldings, which are attached flat to the wall, crown molding rests at an angle between the ceiling and wall. Because it "leans" at an angle, working with crown molding requires cutting compound angles, which can be a tricky operation. To complicate matters even more, walls and ceilings are seldom flat, square, and plumb.

In spite of these obstacles, it *is* possible to get great results when installing crown molding. Like most carpentry jobs, it just takes a little know-how.

Crown Molding Close-Up

If you haven't purchased crown molding before, it's worth taking a few minutes to familiarize yourself with some of the basics.

Which Side Is Up? — All crown molding has a decorative profile milled into the face of the molding. At first, it may not be obvious which side faces up toward the ceiling. An easy way to determine this is to look at the end of the molding *(Photo, left)*. Typically, an ogee profile (a double curve in the shape of an elongated 'S') is closest to the ceiling, while the smaller profile (often a cove) is at the bottom.

Size — In addition to a variety of profiles, crown molding also has a wide range of sizes. The most common width ($3^5/_8$") is readily available at most home centers. At some lumberyards and millwork shops, $4^1/_2$", $5^1/_4$", $6^5/_8$", and even wider moldings are available.

When selecting crown molding, the idea is to make it proportional to the size and height of the room. For example, $3^5/_8$" or $4^1/_2$" molding is

appropriate for an average-sized room (about 150-200 square feet) with an eight-foot ceiling. But you'd want to use wider molding in a large room with a higher ceiling.

Spring Angle — Regardless of its width, crown molding is milled so it sits against the wall and ceiling of the room along two narrow edges or "flats" *(Inset Illustration, page 60)*. With these flats fitting tightly against those surfaces, the molding is tilted at an angle called its *spring angle*. You'll need to take this angle into account when cutting crown molding and when making the backers that fit into the opening behind the molding (more on that later).

Planning the Job

As with any job, some careful planning up front will go a long way toward preventing problems from cropping up later.

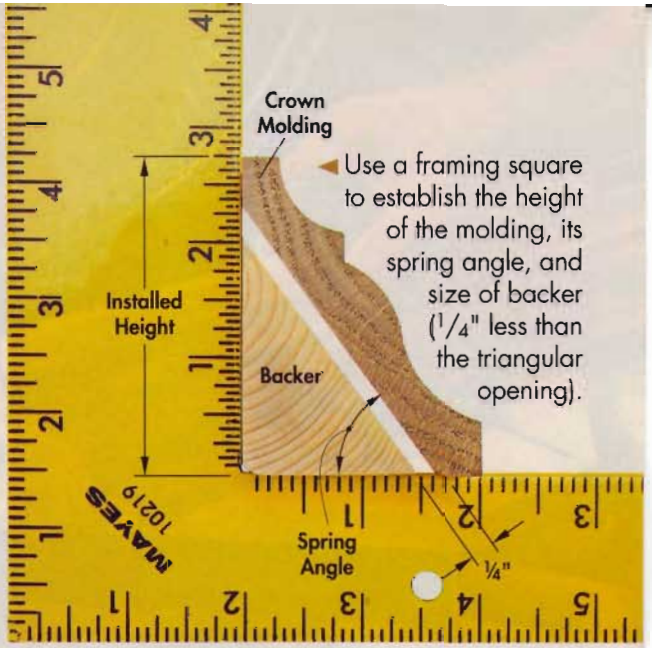
Locate Wall Studs & Joists — For starters, I mark the locations of the wall studs and ceiling joists with blue (or purple) painter's tape. This type of tape isn't as sticky as regular masking tape, so it can be easily removed without damaging the paint once you've finished the job.

Layout Lines — The next step is to mark lines on the tape indicating the location of the *bottom* edge of the crown molding. These lines will make it easy to position the molding during installation.

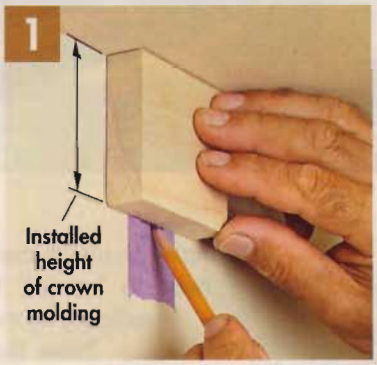
To determine the location of the lines, you'll need to know the "height" of the crown molding once it's installed. An easy way to do that is to use a framing square and a scrap piece of molding *(Photo, right)*. Just measure the distance from the corner of the square to the bottom edge of the molding. Then, cut a block to match that distance, and use it as a gauge when marking the layout lines *(Fig. 1)*.

Backers — There's one situation you'll run up against that needs special attention. If the ceiling joists run parallel to a wall, there won't be anything to nail the top of the molding to along the wall. Installing short backers (about 12" long) will provide a solid mounting surface.

Backers are triangular lengths of 2x stock that fit into the opening behind the molding. Here again, use a framing square and scrap molding to determine the size of the opening *(Photo, above)*. Keep in mind that you don't want the backers to fit tightly against the molding. Leaving a 1/4" gap provides clearance that allows you to adjust the fit of the molding. Once you determine the correct size, tilt the table saw blade to match the spring angle, and rip a 12"-long bevel in a 2x4 *(Fig. 2)*. Stop the saw, then crosscut the backer to length.



Use a framing square to establish the height of the molding, its spring angle, and size of backer (1/4" less than the triangular opening).



A block that matches the installed height of the crown molding makes a handy gauge when laying out the location of the bottom edge of the molding.

To make a backer, tilt the blade to match the molding's spring angle. Make a 12"-long bevel rip in a 2x4, turn off saw, then cut the backer to length.

TOOL ROUND-UP

Using the right tools for the job is half the battle when installing crown molding.

For starters, a miter saw with a good quality crosscut blade will ensure fast, accurate, glass-smooth cuts. (For this job, I used a Freud 12" Ultimate Cutoff Blade with 96 teeth.)

To create a coped joint on the inside corners, you'll need to round up a coping saw — with a *new* blade — and a half-round file. A block plane will help to refine the miter joints on the outside corners of the crown molding. Finally, an air nailer simplifies installation considerably.

tips & tricks for CUTTING CROWN

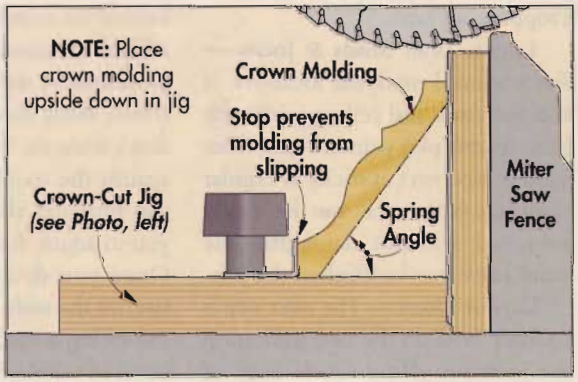
One of the easiest ways to cut crown molding is to position it at its *spring angle* on the miter saw. That is, with the workpiece tilted so it duplicates the angle of the molding between the ceiling and the wall.

The best way to do that is to use a jig that holds the molding at the correct angle and keeps it from slipping during the cut. This can be a manufactured jig *(Photo, left)*, or you can knock out your own shop-made version, as shown on page 36.

Upside Down — Either way, you'll need to place the molding in the jig so it's *upside down*. In other words, the top edge of the molding rests on the base of the jig, and the bottom edge sits against the fence. (Think of the base as the ceiling of the room and the fence as the wall.)

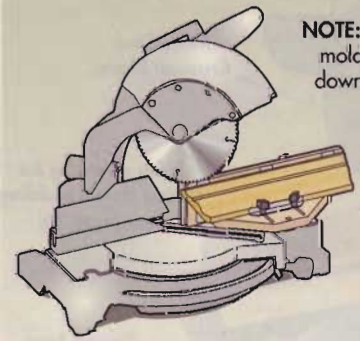
And Backward — Since the molding gets sawn upside down, it must also be placed in the jig *backwards*. The *Miter Saw Setup* Box below demonstrates this concept for cutting both inside and outside corners.

▲ To make an inside corner joint, you first need to "reveal" the profile of the molding by cutting a 45° miter. Note that the molding is upside down and tilted at its spring angle. To prevent it from slipping, I use a jig manufactured by Bench Dog. **Source:** 800-786-8902 or visit BenchDog.com.



Miter Saw Setup

LEFT INSIDE CORNER



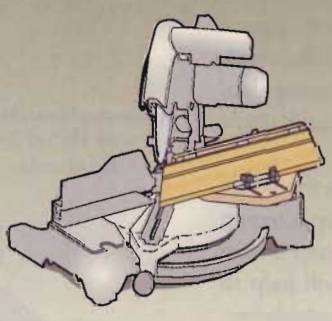
Rotate saw 45° right, place molding on right

RIGHT INSIDE CORNER

NOTE: Place crown molding upside down for all cuts

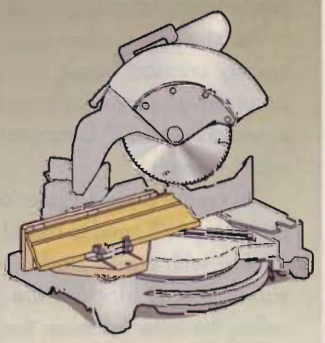
Rotate saw 45° left, place molding on left

LEFT OUTSIDE CORNER



Rotate saw 45° left, place molding on right

RIGHT OUTSIDE CORNER



Rotate saw 45° right, place molding on left

Coping Inside Corners

More often than not, you'll be cutting an inside corner joint when working with crown molding. For an inside corner, I use a *coped joint.* With this type of joint, one molding is butted into the corner *(see Photo on page 64).* The adjoining piece is cut, or coped, to fit against it.

Before coping the joint, you'll need a "map" of the decorative profile of the crown molding to use as a guide while making the cut. That map is easy to come by. You simply position the molding on the jig for either a left- or right-inside corner, and then cut a 45° miter on the end of the molding *(see Photo on page 62).* The freshly cut edge provides a visual reference that you can follow as you make the cope cuts.

Note: It's a good idea to make the miter cut on an extra-long piece of molding (about 6" longer than needed should be fine). That way, if you make a mistake while coping, there will still be enough material to trim the end and try again.

Coping Saw Technique — Once the miter cut is made, it's time to cope the molding to fit against the adjoining piece *(see Figures 1 through 4 below).* The whole idea here is to backcut the end of the molding, following the contour of the profile as closely as possible, and leaving a slightly "thick" edge *(Photo, right).*

For a chip-free cut, you'll want to mount the blade so the teeth point *away* from the handle of the saw. It also helps to make relief cuts, which allow the waste blocks to fall free *(Figures 1 and 3).* Finally, no matter how carefully you cut, you'll probably still need to file the end of the molding for a perfect fit *(Fig. 4).*

▲ When making a cope cut, tilt the saw to make a backcut, then follow the contour of the profile as closely as possible, leaving a slightly "thick" edge.

COPING WITH COPED CUTS

▲ The first step is to make a relief cut from the back of the molding to the transition line between the two decorative profiles.

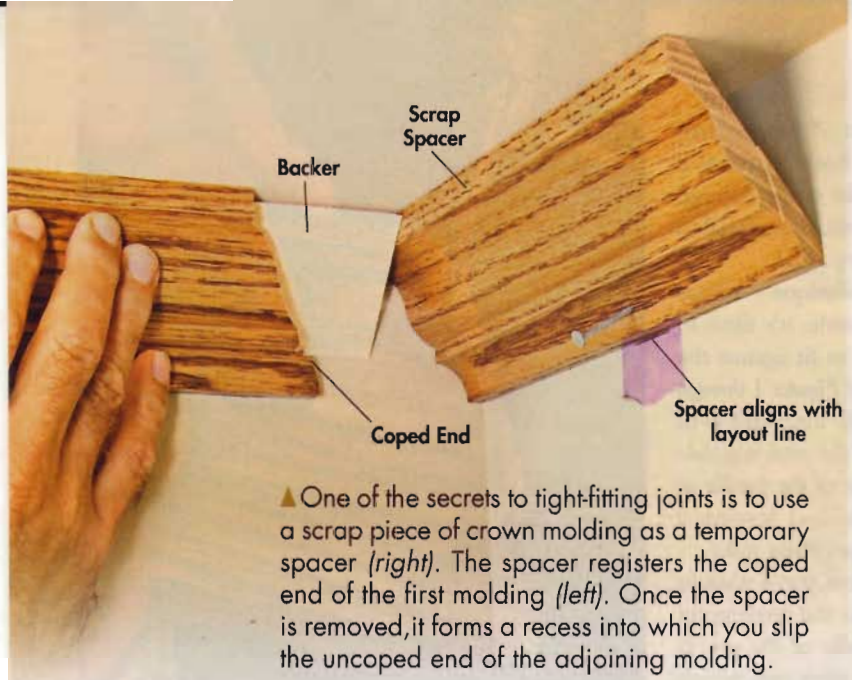
▲ With the coping saw held at a steep angle, make a backcut along the cove profile, stopping at the relief cut.

▲ Starting from the back of the molding, make a second relief cut up to the transition line where the ogee profile begins.

▲ After completing the cope cuts *(Main Photo, above)*, use a half-round file to refine the fit, working just up to the edge.

CHECKING THE FIT

To check the fit, hold the coped end against a scrap piece of molding. Small gaps like those shown in the *Upper Photo* are easily remedied with a half-round file *(see Fig. 4 at left).* Check your work frequently to achieve a tight-fitting joint *(Lower Photo).*



▲ One of the secrets to tight-fitting joints is to use a scrap piece of crown molding as a temporary spacer *(right)*. The spacer registers the coped end of the first molding *(left)*. Once the spacer is removed, it forms a recess into which you slip the uncoped end of the adjoining molding.

the crowning touch
INSTALL MOLDING

Once you've mastered the techniques for making a coped joint, installing crown molding in a room with four inside corners isn't difficult. (I'll get to outside corners later.) Still, there are several things to consider.

Go Long — Take the length of the molding, for instance (measured from long tip of the coped end to long tip of the uncoped end). As a rule, cut the molding 1/8" longer than the distance from one wall to the molding on the opposite wall. This extra length will allow you to "spring" the molding into place for a tight fit.

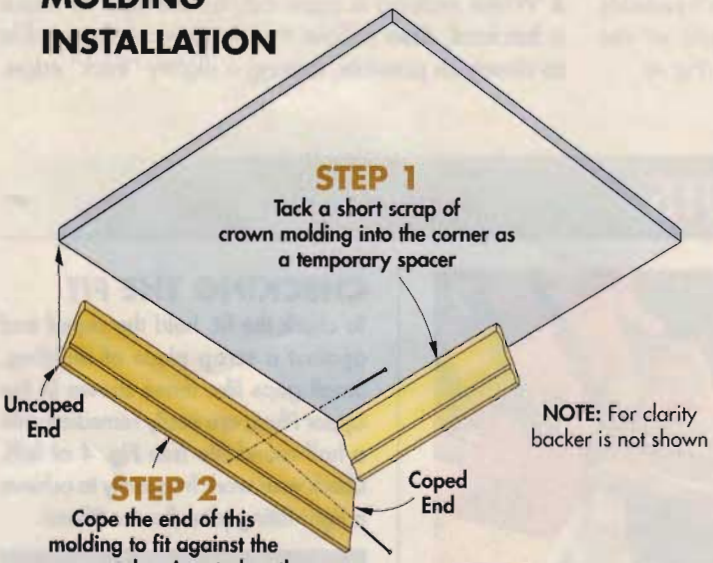
Backcut Uncoped End — Of course, when trimming the molding to length, you'll be working on the uncoped end. At first, it might seem like you'd want to cut this end square. But by backcutting the end slightly, you'll avoid any problems that may arise from square-cut ends *(see Sidebar on page 65)*.

"Pin" the Middle — Another thing to keep in mind is how the molding gets attached. It's fastened with finish nails driven through the top and bottom edges into the ceiling joist (or backer) and the wall studs *(refer to Illustration on page 60)*. When installing the nails, it's best to "pin" the molding in the middle first. This leaves both ends free so you can twist the molding slightly and adjust the fit of the joint as needed.

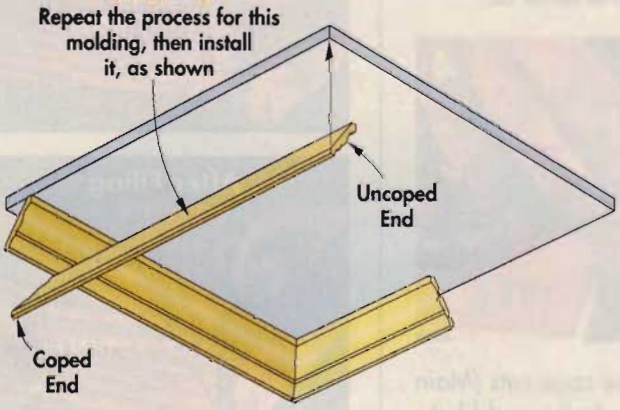
A Double-Cope Dilemma — When installing crown molding, many carpenters start with the longest wall in the room and square-cut both ends to fit that wall. The two adjoining pieces of molding are then coped on one end and square-cut on the other. This means the last piece of molding has to be coped on *both* ends.

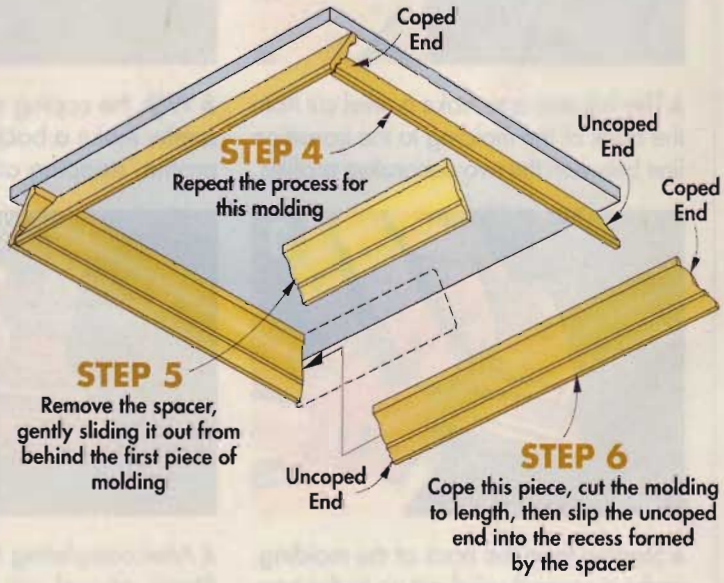
Now, coping one end of the molding isn't difficult. And neither is coping the second end for that matter. But

MOLDING INSTALLATION



NOTE: All uncoped ends are backcut at a slight angle *(see Page 65)*





keep in mind that while you're making that second coped cut, you have to trim the molding to final length at the same time. That complicates things considerably.

Use A Single-Cope Method — One solution is to use a method that involves coping only *one* end of each molding. This coped end fits against a spacer made from a scrap piece of crown molding that's temporarily tacked in place *(see Photo on page 64)*. The other (uncoped) end simply gets backcut as I explained before. For subsequent pieces, the process is the same — coping one end, then backcutting the uncoped end *(see Illustrations on page 64)*.

After working your way around the room, carefully remove the spacer. Then fit the uncoped end of the final piece into the recess that was formed by the spacer. The two pieces should fit together like a nut in a shell. If not, just give one piece or the other a slight twist until they fit just right, then nail them in place.

Splices for Long Runs

Ideally, every piece of molding would be long enough to span the length of the wall. In practice, you'll sometimes have to splice two (or more) pieces of molding together to make a single long molding.

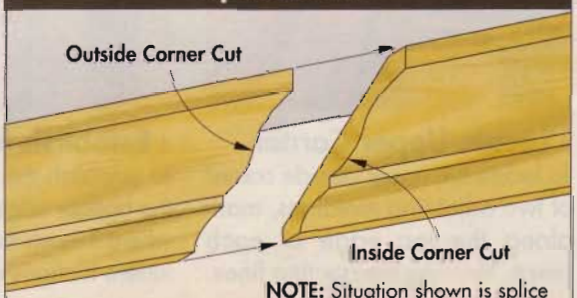
In a splice joint, a miter cut is made in each molding so the two pieces overlap. To accomplish that, it requires two types of cuts: an inside-corner cut on one piece and an outside-corner cut on the other. Here again, both cuts are made with the molding placed upside down in the miter saw jig and the saw set to 45°.

Splice joints won't always fit perfectly because of slight variations in the wall or the moldings. But paying attention to how the pieces overlap will help conceal the differences. In general, if you enter the room and the splice is on the left, use a left-over-right splice joint *(Splice Detail)*. If it's on the right, use a right-over-left joint.

Glue First, Then Install — To keep the joint properly aligned, glue the splice together before installing the molding. Since the glue surface is fairly small, I use a short length of backer to strengthen the joint *(Photo, above)*. Even with the backer glued on, though, the molding is still fairly fragile until it's installed, so handle it carefully.

▲ A short length of backer adds rigidity when gluing a splice joint together. Careful attention to the grain makes for a virtually seamless joint *(right)*.

Splice Detail



NOTE: Situation shown is splice joint on left as you enter room

BACKCUT FOR CLEARANCE

Typically, the drywall compound used to finish a wall produces a slightly rounded corner. As a result, the upper corner of the uncoped (square) end on a piece of crown molding often digs into the corner, damaging the drywall.

To provide clearance in the corner, I make a 10° backcut on the uncoped end *(Fig. 1)*. Start about $^1/_2$" in from the end, and leave the bottom edge of the molding intact. Of course, this creates a gap when you install the molding *(Fig. 2)*, but that's covered by the coped end of the adjoining piece.

get perfect-fitting OUTSIDE CORNERS

It's rare that an outside corner in a room is perfectly square. So in order to get a tight-fitting joint on an outside corner, the crown molding must be cut to match the *actual* angle of the corner. So how do you determine that angle?

Locate Upper Outside Corner — The first step is to locate a point on the ceiling where the upper outside corners of the two mating pieces will come together *(Photo, left)*. To do that, you'll need to lay out two intersecting lines on the ceiling, as shown in *Figure 1*.

Establish Miter Angle — The next step is to establish the actual miter angle for each piece of molding. As you can see in *Figure 2*, it's defined by marking the top and bottom edges on each molding.

Miter Moldings — At this point, you're ready to miter the ends of the moldings. As before, place each molding upside down and backward. Then rotate the saw 45° to either the right or left *(Miter Saw Setup, page 62)*.

So why go to the trouble of marking the actual miter angle on the molding and then setting the miter saw to 45°? Because it allows you to "sneak up" on the actual angle.

As you can see in the *Sidebar* below, the 45° miter cut, which is made 1/4" to the waste side of the layout lines, is just a starting point *(Fig. 3)*. Ideally, when you "eyeball" the cut end, it should be parallel to the lines, but chances are it won't be. If not, rotate the saw just a hair in the proper direction and make a second cut — also slightly wide of the marks *(Fig. 4)*.

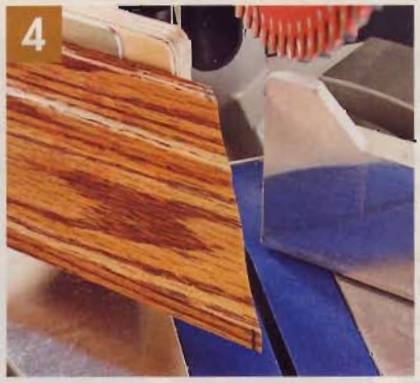
Now compare that cut edge to the layout lines, checking that it's parallel. If not, try again. If it is parallel, make the final cut, "saving" the pencil line *(Fig. 5)*.

Locate Upper Corner
To locate the upper outside corner of two adjoining moldings, mark along the top edge of each piece, forming intersecting lines.

Establish Miter Angle
To establish the miter angle, mark the bottom edge of each molding where it meets the wall, and the top where it aligns with the crosshair.

SNEAKING UP FOR A TIGHT FIT

With the miter saw rotated to 45° (right or left) make a cut about 1/4" to the waste side of the layout lines.



Adjust the saw angle to make a cut parallel to the two marks. Cut to the waste side. Readjust saw if needed.

Now make the final cut, leaving the pencil lines intact. Use a block plane for final fitting *(Inset Photo)*.

gift PROJECT

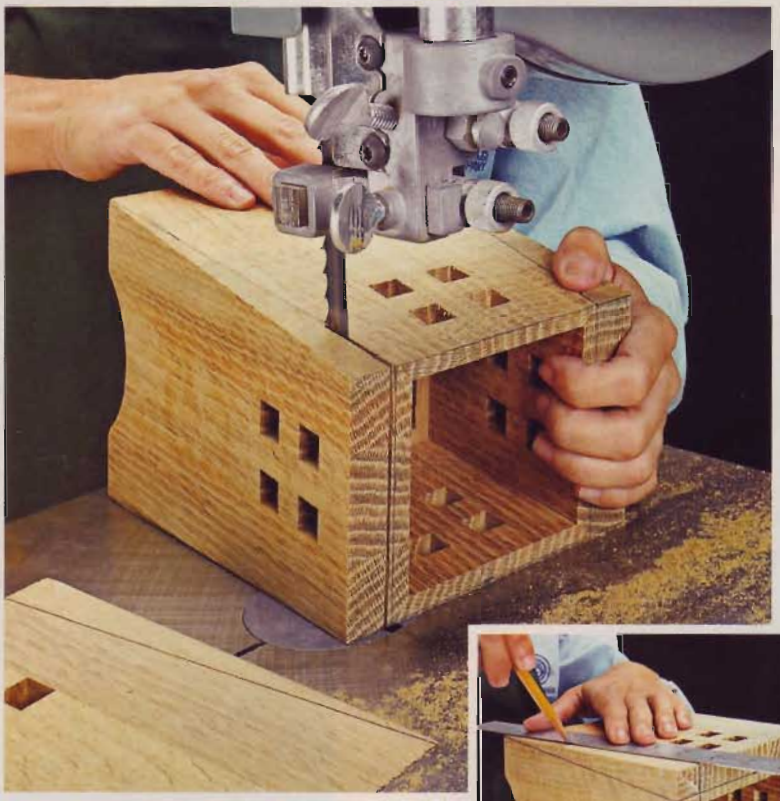
scent-sational potpourri Gift Box

It's no secret — I'm a sucker for the ray-fleck figure of quartersawn white oak (the light-colored wavy figure that cuts across the straight grain). This potpourri box is a perfect showcase for such figured wood. With this particular oak, however, I got an added bonus — dark-colored mineral streaks that resemble a flickering flame.

Surprisingly, these streaks were revealed in the process of making the tapered sides. That involves gluing up a box with thick, beefy sides and then using a band saw to slice a wedge-shaped section off each face. Now mineral streaks are rare, so there's no guarantee you'll get this same effect. But I know you'll be fascinated by the tapering technique *(see page 68)*.

Another interesting challenge is making the "windows" that disperse the scent of the potpourri. Rather than spend hours chiseling these openings — a formidable task in white oak — I used a simple trick that only took a few minutes *(page 69)*.

Then there's the lid. It appears to be ebonized, or stained black, a process that usually involves mixing a special dye. Here though, I used spray paint and a paper towel to achieve the same result — and still let the figured wood show through.



▲ To lay out the tapers, mark lines 1/4" in from the opening at the top of the box. Connect the ends of the lines with the bottom corners of the box *(Inset)*. Then slice a wedge-shaped section off each side to create the tapers.

build a box with
TAPERED SIDES

As the saying goes, a picture is worth a thousand words. So you might want to clip the *Photo* at left to show your friends when they ask how you made the tapered sides of this potpourri box. Of course, first of all you'll need to make a box. And that starts with the sides.

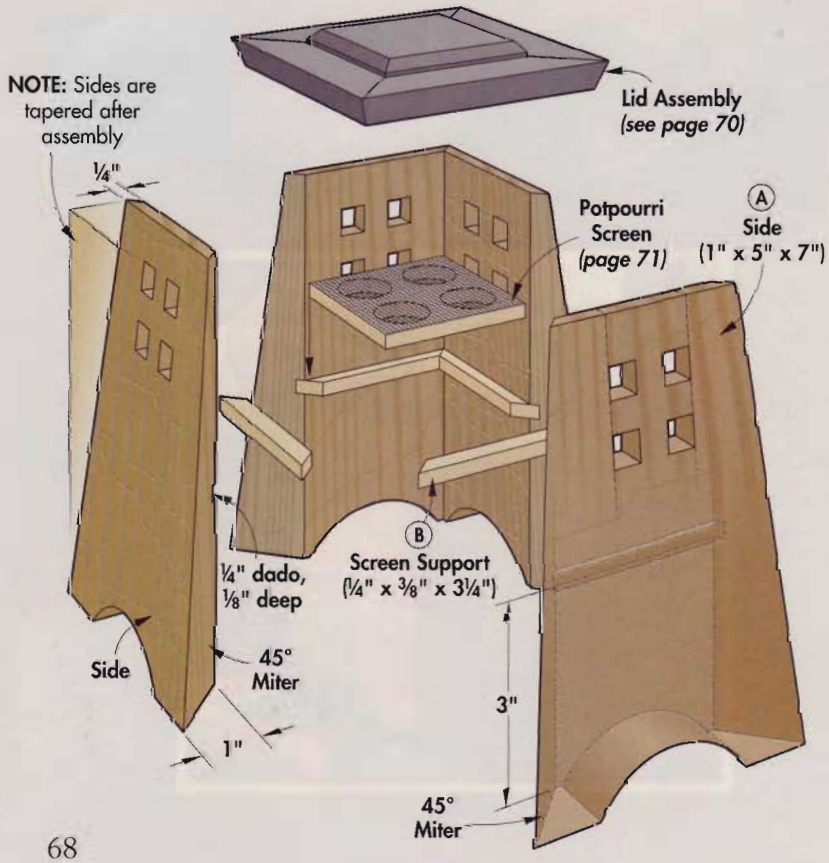
Three-Piece Sides — Each side (A) is made up of three pieces of 1"-thick stock *(Side Assembly)*. Using three pieces like this makes it easy to form the square openings in the sides. To do that, cut notches in each center section *(Fig. 1, page 69)*. Then glue the sides together to form identical openings that are aligned with each other.

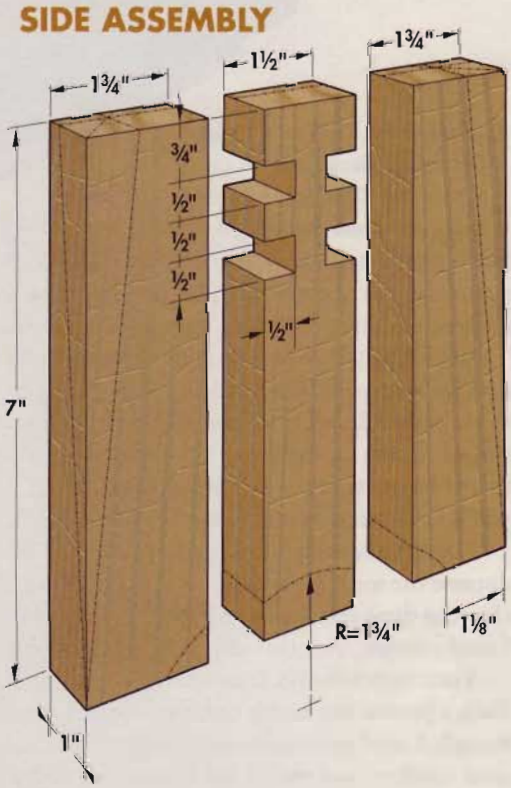
The next step is to cut a shallow dado in each side to hold a hardwood screen support (B) *(see Fig. 2)*. These supports will be mitered to length and glued in place *after* you cut the miter joints used to assemble the sides.

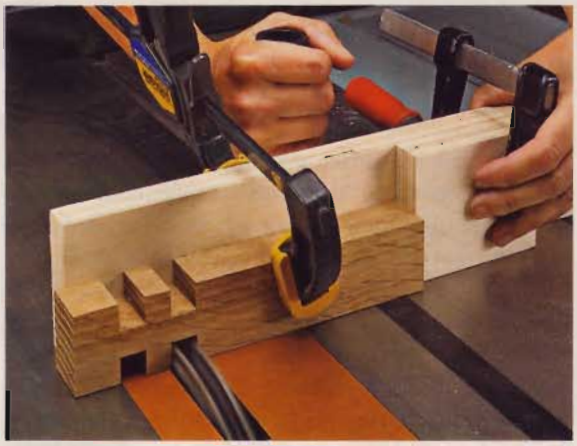
Miter Joints — The miter joints are simple to make. Just rip a bevel on both edges of each side *(Fig. 3)*. Then lay out and cut the decorative arc in the bottom of each side *(Fig. 4)*.

Assemble Sides — Now you're ready to glue and clamp the sides together. The tips shown in *Figures 5 and 6* will ensure a trouble-free glue-up.

Time for Tapers — Once the glue dries, it's just a matter of laying out the tapers and cutting the box to shape on the band saw *(Photos, left)*. Sand the rough surfaces smooth with a stationary belt sander, or use a portable belt sander *(see page 34)*.



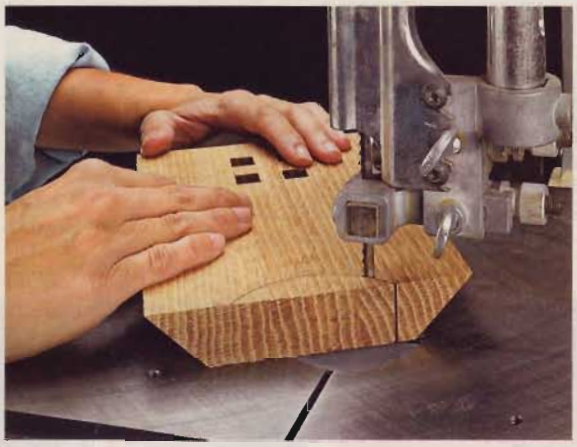




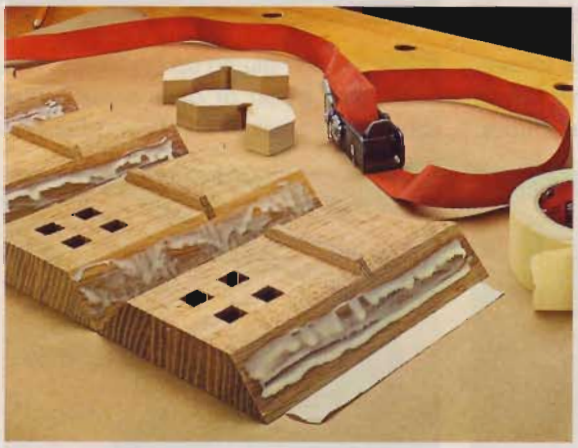
1 To form the "windows" in the sides of the box, use a $^1/_2$" dado blade to cut notches in the center section of each side assembly. A stop block ensures that the notches will align.

2 After edge-gluing the three pieces that form each side, cut a shallow dado in the inside face. This dado accepts the hardwood supports that hold the potpourri screen.

3 With the blade set to 45°, use a push block as you rip the bevels for the miter joints. To avoid trapping the waste piece, position the rip fence so the blade is tilted *away* from it.



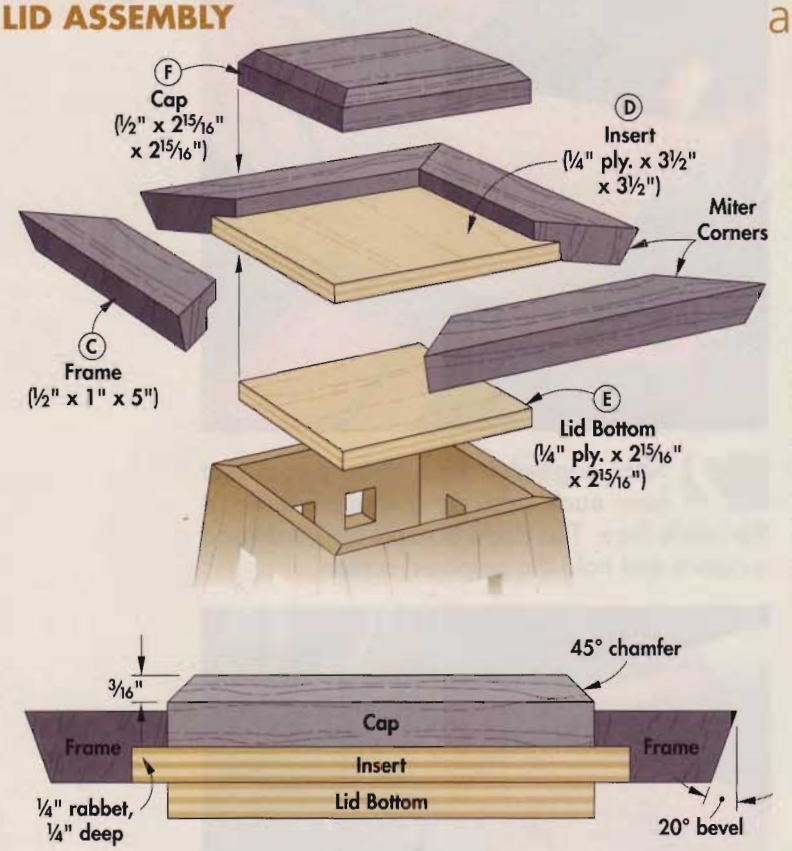
4 Next, lay out and cut the decorative arc on the bottom of each side. Stay to the waste side of the line. Then sand the edge smooth using a drum sander chucked in the drill press.



5 To assemble the box, start by gluing in the mitered screen supports. Stick tape to the sides as shown to help align the tips of the miters. Then brush glue on the beveled edges.

6 After "folding" the sides of the box together, use shop-made corner blocks *(page 34)* and band clamps to distribute pressure evenly and to prevent the miters from shifting out of alignment.

LID ASSEMBLY



a fancy lid finished
WITH FLAIR

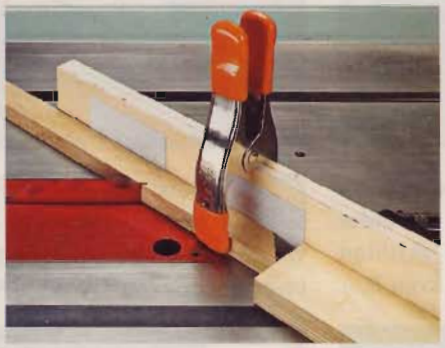
It's the details that make this potpourri box stand out. Details like the fancy "ebonized" lid I mentioned earlier. Less obvious, but equally important, are the beveled edges of the lid that complement the tapered sides of the box.

As you can see in the *Lid Assembly Illustration*, the lid is composed of several layers of material. The main part of the lid is a mitered frame (C) made of hardwood, which is rabbeted to receive a 1/4" plywood insert (D). A plywood lid bottom (E) glued to the insert lets the lid fit into the opening in the top of the box. And a hardwood cap provides the crowning touch.

Okay, I know it's a fancy lid. But what's the big deal with all these layers? Why not just make a solid-wood frame and panel lid? The short answer is wood "moves." When the wood expands and contracts with changes in weather, it could affect the fit of the lid. Worse yet, the miter joints could open up, creating an ugly gap. Because plywood is more stable, it prevents that from happening.

Mitered Frame — The frame for the lid comes first. It's made of 1/2"-thick pieces of hardwood, which are assembled with miter joints. These frame pieces are quite

1 To make the frame, start by cutting a rabbet in one edge of an extra-long blank.



2 Use an auxiliary fence for support as you miter frame pieces to length. A stop block ensures accuracy.

3 After gluing up the frame, run a bead of glue around the rabbet and press in the plywood insert.

4 Position the fence so the blade (set to 20°) is tilted *away* from it. Then bevel all four edges of the frame.

5 Align the corners of the lid bottom with diagonal lines on the frame and insert. Then glue it on.

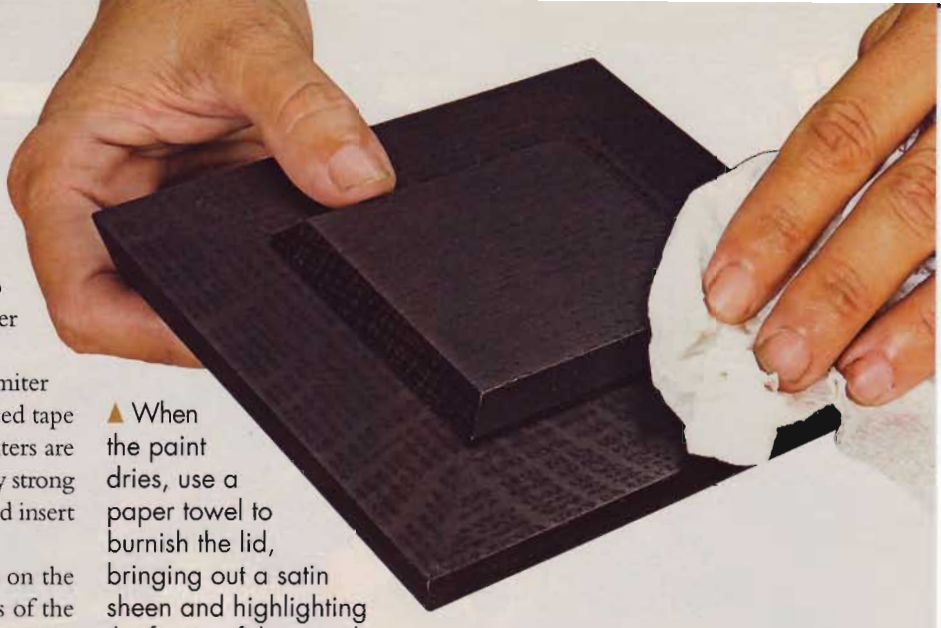
6 A notched push block made from a scrap 2x4 enables you to safely rout the chamfer on the cap.

short, so it's best to work with an extra-long blank for safety. First, rabbet the edge of the blank to hold the plywood insert *(Fig. 1, page 70)*. Then miter the frame pieces to length, as shown in *Figure 2*.

Assembly — After checking the fit of the miter joints, go ahead and glue the frame together. I used tape to "clamp" the miter joints *(Fig. 3)*. Since the miters are primarily end grain, they don't form a particularly strong joint — not yet at least. But gluing in the plywood insert strengthens the entire unit.

With the lid partially assembled, a few passes on the table saw are all that's needed to bevel the edges of the frame *(Fig. 4)*. Then center and glue the lid bottom onto the plywood insert *(Fig. 5)*. Finally, cut a cap (F) from 1/2"-thick hardwood, chamfer the edges *(Fig. 6)*, and glue it into the recess on top of the lid.

"Ebonizing" the Lid — At this point, I decided to experiment a bit by applying an "ebonized" finish to the lid. Typically, this calls for applying a black aniline dye stain, but here's a simple shortcut that produces a similar effect. Just spray on a couple *light* coats of a semi-flat black paint, burnishing the dried paint between coats *(Photo, above)*. I used Krylon No. 1613 spray paint.

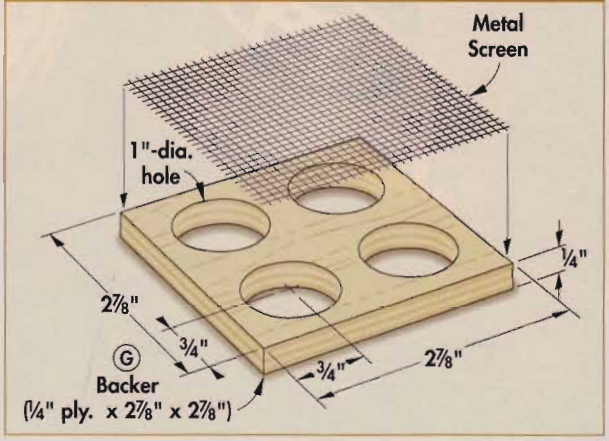


▲ When the paint dries, use a paper towel to burnish the lid, bringing out a satin sheen and highlighting the figure of the wood.

Potpourri Screen

The only thing left to complete this project is to add a screen to hold the potpourri. It's a metal screen glued to a plywood backer (G) that rests on the wood supports in the box. Holes drilled in the backer allow air to circulate and disperse the scent of the potpourri.

Potpourri Screen Detail



Night-Light Insert

▲ As an option, the potpourri box can be converted into a night-light. Just make a new 1/4" plywood backer, drill a hole, and insert a 7-watt lamp holder.

gift PROJECT

etched COPPER-TOP BOX

Where metal meets wood — a thin plate of copper etched with your favorite design is the perfect complement to this oak gift box.

When it comes to gift-giving this holiday season, think outside the box. More specifically, think outside of *this* box. Although you can certainly fill the inside of this box with wonderful items, it really is what's on the *outside* that will make this a cherished gift.

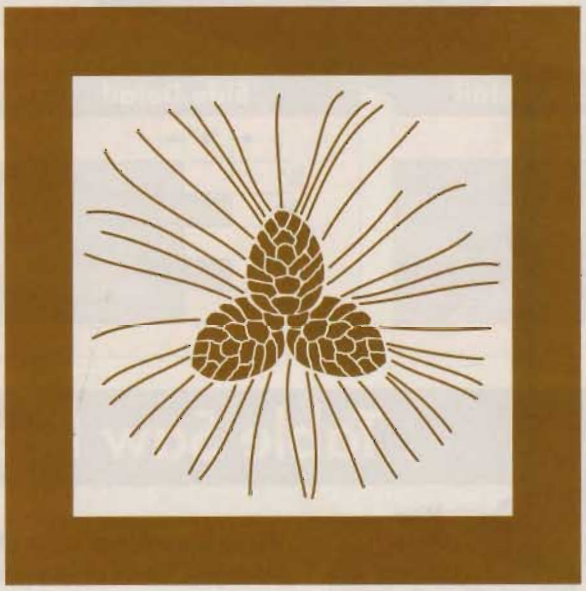
Most notable is the lid, which is adorned with an etched copper plate. Etching copper is a simple technique, which we've detailed on page 77. You can find the thin copper plates in any craft store. From there, you need only choose the perfect pattern for your gift recipients. A few of our favorites are on page 73, but you can certainly create your own easily enough.

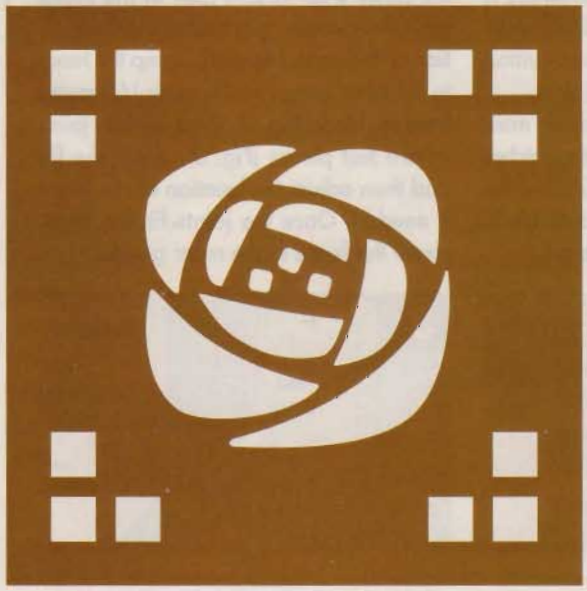
Of course, a lid like this can't top just any old box. So we used wide box joints as a decorative touch. The alternating end grain and face grain of these joints create the beautiful checkerboard pattern that box joints are legendary for. And you'll be glad to know that we have a five-minute jig for the table saw that you can use to cut these joints flawlessly time and again *(see page 74)*.

Etched copper and box joints notwithstanding, the best thing about this box is that it's just ripe for personalization. By selecting a different pattern or even a different wood, you can truly personalize this gift for everyone on your list. Now *that's* thinking outside the box. And after all, it's the thought that counts.

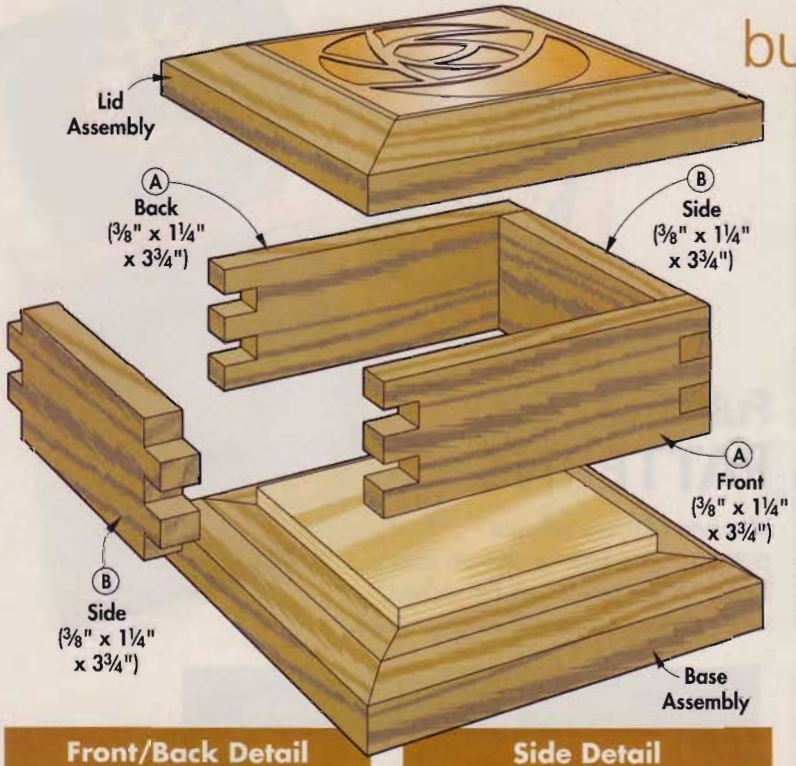
Full-Size
PATTERNS

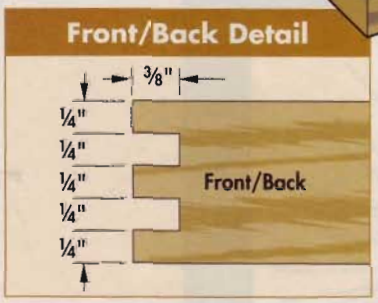
Use one of these full-size patterns, or create your own design. Note: White areas will be etched, while brown areas will remain shiny.

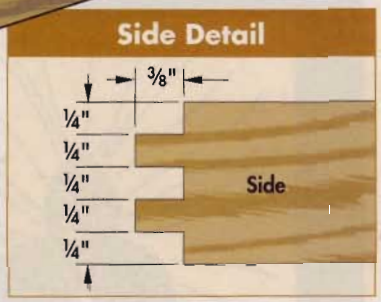




building the BASIC BOX







This project starts out as a simple four-sided box. You might think that the box joints complicate building it, but that's just not so. In fact, all four sides of the box are the same length, so you can start by cutting four identical pieces. Now mark two as fronts and backs (A), and two as sides (B), as shown in the *Illustration* at left.

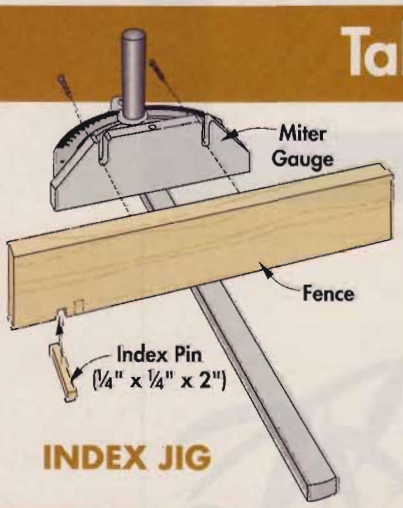
Notice that the front and back pieces have three fingers and two notches. This means, of course, that the sides have two fingers and three notches. Put them together, and you get a strong, interlocking box joint.

To produce tight-fitting box joints, the width of the fingers has to match the width of the notches exactly. In addition, the fingers and notches have to be spaced the same distance apart.

I know achieving both of these requirements might sound like a pretty tall order. Fortunately, a simple shop-made jig attached to the miter gauge on a table saw makes it easy *(see Sidebar below)*. It also makes sizing and spacing of the fingers and notches automatic. Using this jig, a 1/4" dado blade, and the technique explained on page 75 produces box joints that fit like a glove.

Assembly — Once the joinery is complete, it's time to assemble the box. To do that, brush glue into the notches in all four pieces, tap them together with a mallet, and check for square. When the glue dries, sand the ends of the fingers flush to complete the box.

Table Saw Box Joint Jig



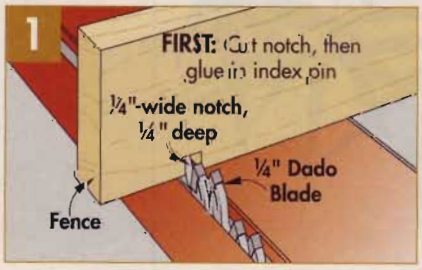
INDEX JIG

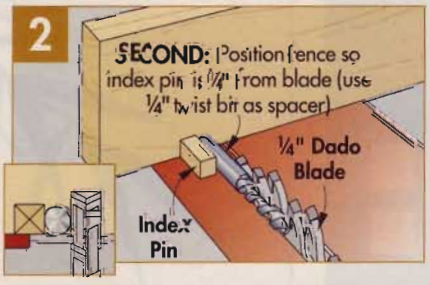
This jig has only two parts: a fence and an index pin. Yet it's still very accurate.

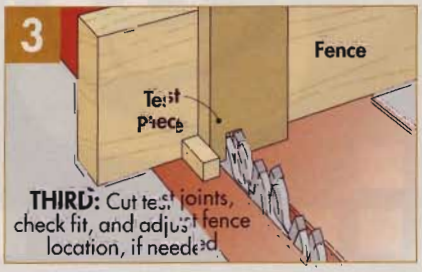
Index Pin — The key to this accuracy is the index pin. It's a 1/4" x 1/4" block used to position the workpieces when cutting the notches that form the box joints.

For tight-fitting joints, the index pin must be the same size as the width of the notches (1/4"). It also has to be located 1/4" from the dado blade. And of course, the dado blade has to be set up for a 1/4"-wide cut.

Three-Step Setup — Setting up the jig is a three-step process. First, cut a notch in the fence *(Fig. 1)* and glue in the index pin. (There's nothing critical about the location of this notch.) Second, clamp the fence to the miter gauge so the pin is 1/4" away from the blade *(Fig. 2)*. Third, cut box joints in two test pieces *(Fig. 3)*, check the fit, and then adjust the location of the fence if needed. Once the joints fit just right, screw the fence to the miter gauge.







how to make
BOX JOINTS

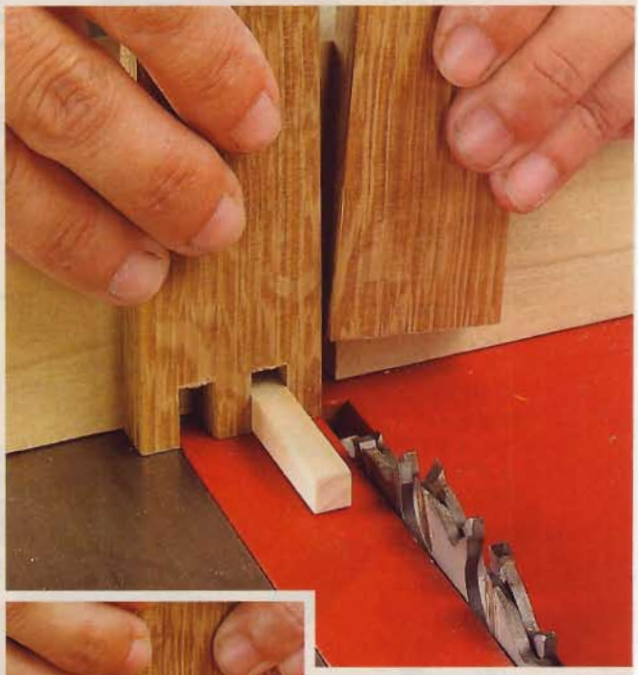
The box joint jig on page 74 assures that the fingers and notches of the box joints will all be the same size *and* that they'll be spaced evenly. So all you need to do as you start is make sure the dado blade is set to the correct height. Because the fingers on one piece extend all the way through the notches in the mating piece, the height of the dado blade must match the thickness of the pieces ($^3/_8$" in my case).

Label the Pieces — Before you start cutting, label the top edge of all four pieces. This will prevent any confusion as you machine them. Plus, it will simplify assembling the pieces properly *(refer to Fig. 6)*.

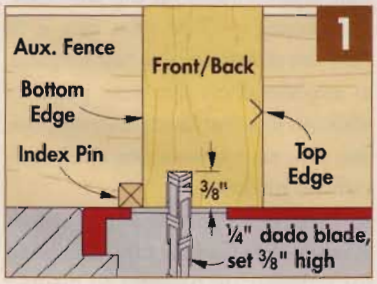
Notch the Front/Back — The first step is to cut the notches that form the fingers in the front and back pieces. Start by butting the *bottom* edge of one of these pieces against the index pin on the jig *(Fig. 1)*. Then, hold the piece firmly against the fence, and cut the first notch. Now set that notch over the pin to reposition the workpiece, and cut the second notch *(Fig. 2)*. Repeat the process for the opposite end, as well as the other front/back piece.

Side Pieces — At this point, the joinery is complete on the front/back pieces. But you'll still need one of these pieces to correctly position the box sides. To do that, butt the *top* edges of the two pieces together, as shown in *Fig. 3*. This way, the first notch you cut in the side will be sure to align with the corresponding finger in the front or back piece.

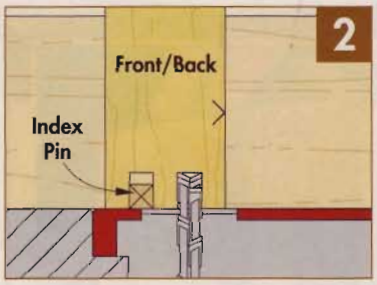
Once this is done, the machining process for the sides is similar to that of the front and back pieces. Butt the first finger against the pin to position the side for cutting the second notch *(Fig. 4)*. Then fit the second notch over the pin to cut the last notch *(Fig. 5)*. Repeat for the other end, as well as the second box side.



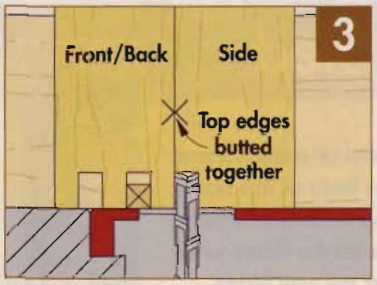
▲ After cutting the notches in a box front (or back), use it to position the side. Note how the notch cut last straddles the index pin and the top edges are butted tightly together.



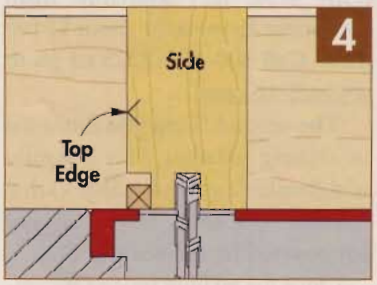
▲ With the bottom edge of a front (or back) piece butted against the index pin, cut the first notch.



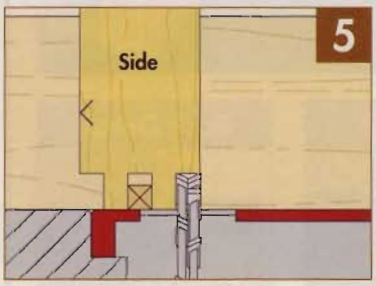
▲ Reposition the workpiece so the notch straddles the index pin, then cut the second notch.



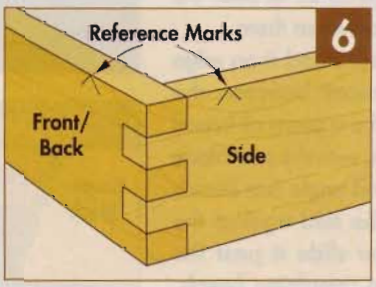
▲ Butt the top edges of the front/back and one side together. Then cut the first notch in the side.



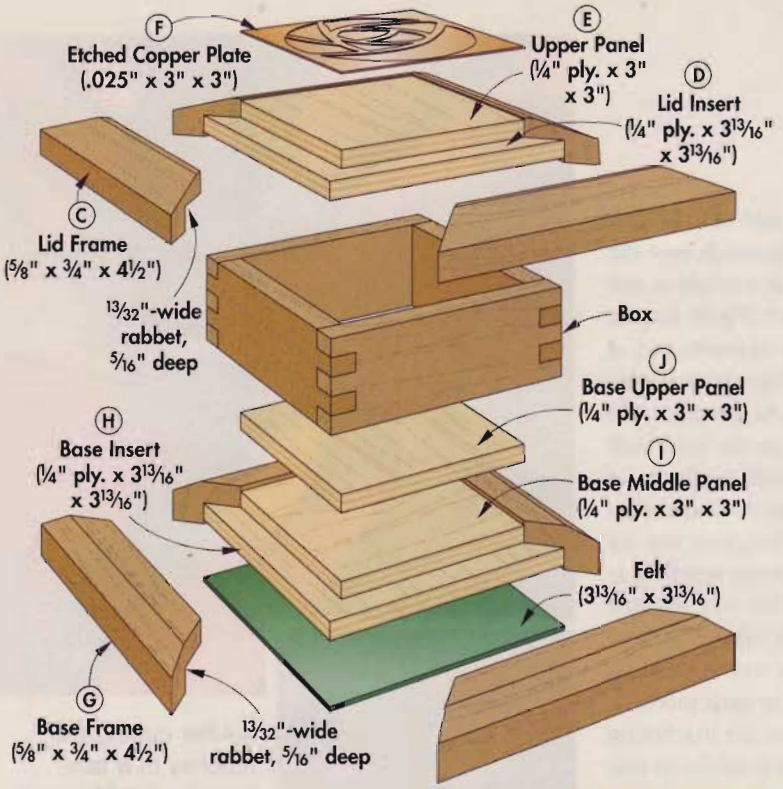
▲ Next, set the edge of the just-cut notch against the index pin, and cut the second notch.

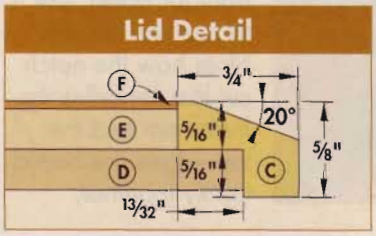


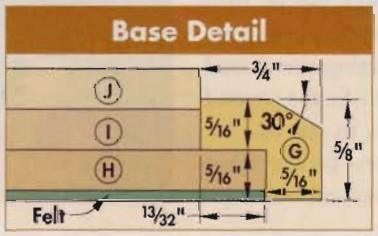
▲ With the middle notch straddling the pin, cut the final notch in the side. Repeat for the other end.



▲ For trouble-free assembly, make sure the reference marks are at the top of the box.







adding the LID & BASE

Like the lid on the potpourri box *(page 67)*, the lid and base of this gift box are plywood panels surrounded by hardwood frames. Of course, the lid has an etched copper plate attached to it instead of a hardwood cap.

Lid Overview — The frame (C) of the lid is rabbeted to hold a ¼" plywood lid insert (D). A plywood upper panel (E) attached to this insert provides a mounting surface for the copper plate (F). The sequence for making and fitting these parts is the same as that described for the lid of the potpourri box on page 70.

One last detail is to cut a decorative bevel on all four edges of the lid. The table saw makes quick work of this. But since the lid is fairly small, it's best to make a sled to hold it while you're cutting the bevels. This keeps your fingers safely away from the saw blade *(Sidebar, below)*.

Build a Base — The construction of the box base is approached the same way. The *Illustration* at left and the *Base Detail* provide all the information you need here. There is one thing to note though. For appearance, the bevel on the base is 30° (compared to 20° on the lid). Here again, use the sled to make the beveled cuts.

Copper Plate — Now all that's left is to add the copper plate. It's a .025"-thick plate that can be purchased at a hardware store or hobby shop. To cut the plate to size, use double-sided tape to attach it to a scrap piece of plywood. Then cut a 3"-square using a carbide-tipped blade on the table saw.

Etching — The next step is to etch the design on the copper plate, as explained on the next page. In addition to a few household supplies, this process requires two fairly specialized materials.

First is a type of paper called Press-n-Peel transfer film. Designed for transferring patterns to printed circuit boards, it allows you to use a laser printer or photocopier to imprint designs on copper that will resist acid. (It's available from Electronix Express for about $1 per sheet. Call 800-972-2225 or go to www.elexp.com)

The second thing you'll need is an etching solution. This is a mild acid (available at Radio Shack) that "erodes" the areas on the copper not covered by the transfer film.

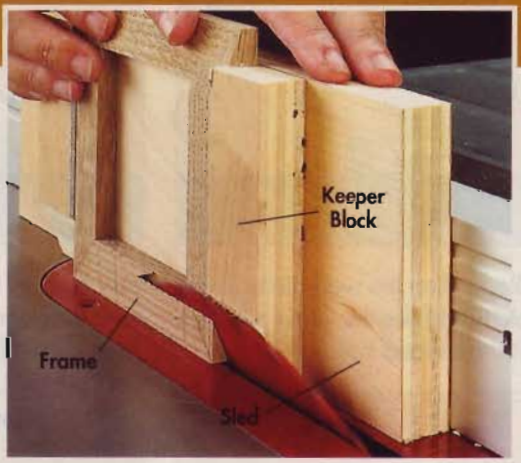
Once the etching process is completed, "rough up" the back of the copper plate. Then simply attach it to the lid with spray adhesive.

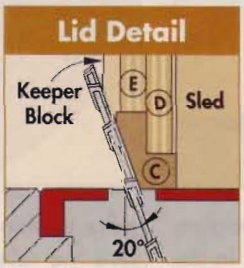
Bevel Sled

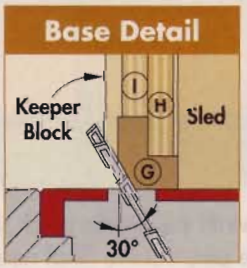
To safely cut a bevel on a small frame like the lid or the base of this box, I use a simple shop-made sled *(Photo, right)*. The sled holds the frame while you slide it across the saw blade.

This bevel-cutting sled only takes a few minutes to make. It's just a scrap piece of ¾" plywood with two keeper blocks glued on to hold the frame securely between them.

To use the sled, stand it on edge and slip the frame between the keeper blocks like a piece of bread in a toaster. Then, with the saw blade tilted to the desired angle *(see Details at right)*, hold the sled against the rip fence as you slide it past the blade. To cut the remaining bevels, make additional passes, rotating the frame 90° between each pass.







magic in metal
Etching Copper

The key to the etching process is a special type of paper called transfer film. By using a photocopier or laser printer, you imprint the decorative pattern on this film. Then transfer the pattern from the film to the copper with a hot iron. This covers certain areas with an inky substance that resists the etching solution. The exposed shiny areas will be etched to create the design.

▲ After cleaning the copper plate with denatured alcohol and a Scotch-Brite pad, transfer the printed pattern to the plate by ironing it for two minutes on the "cotton/wool" setting.

▲ Quench the copper under running water, then carefully peel off the film.

▲ Use packing tape to cover any voids where the transfer didn't "take."

▲ To etch the copper, submerge the plate in 1/4" of etching solution in a plastic container for one hour, agitating frequently.

▲ Use a paper towel and acetone to remove the inky residue. This cleans the copper, revealing the etched design.

▲ To create a patina, apply a coat of Patina Green Antiquing Solution (available at craft stores). Let it sit for 1-2 days.

◄ To finish the plate, sand it with 1500-grit paper to remove the excess dried patina solution.

The copper looks great without the optional patina treatment, too. ►

CORDLESS JIG SAWS

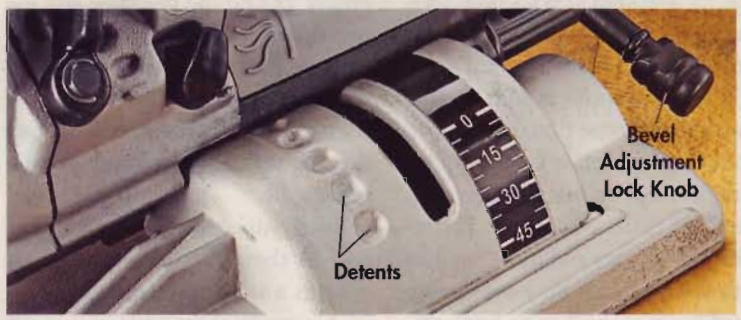
It's been nearly seven years since DeWalt introduced the first 18-volt cordless jig saw. Other manufacturers quickly followed suit, of course, but this past year in particular has seen a flurry of activity within this category. Most notably, Ridgid and Delta each added a jig saw to their cordless line-ups while Ryobi and DeWalt upgraded their existing tools.

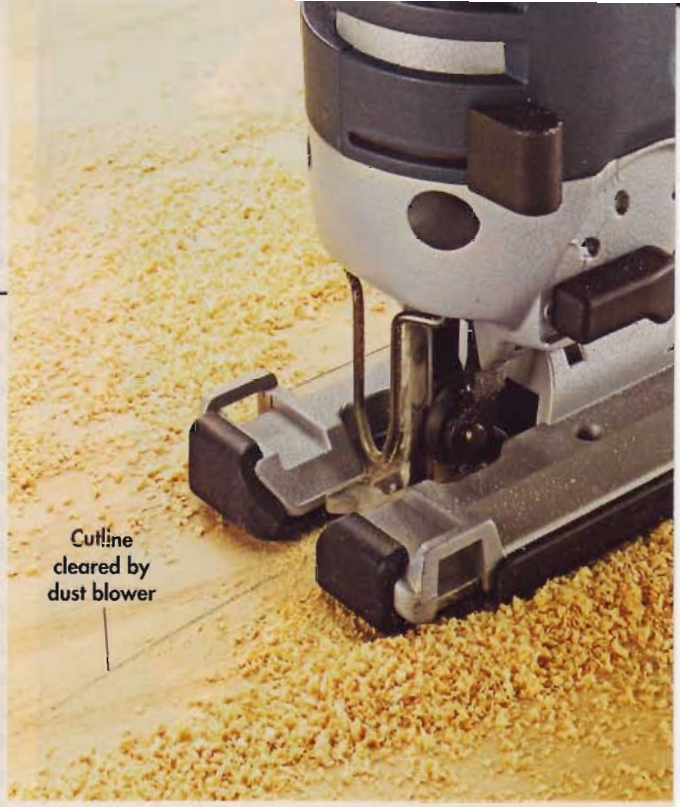
In the wake of this new vitality, it seemed an appropriate time for us to take a close look at cordless jig saws and determine their place in the cordless tool food chain, as well as their pecking order within the category.

DETAILS that make a difference

► DUST BLOWER

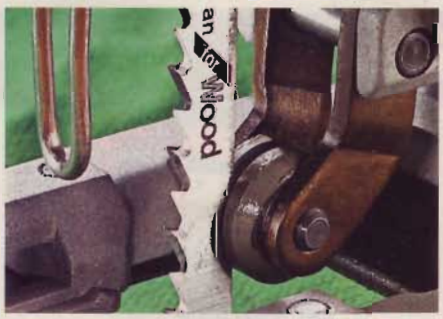
Scroll cutting is challenging enough, but becomes virtually impossible when you can't even see the cutline through the dust. An integral blower on a jig saw solves that problem *(Bosch shown)*.





▲ SHOE ADJUSTMENTS

Bevel cuts are not a jig saw's strong suit, but when you need this feature, it's nice to know you can set up the saw quickly and accurately. Tool-less adjustments and detents earn high marks when comparing this detail *(Porter-Cable shown)*.



▲ BLADE SUPPORTS

Jig saw blades are prone to flex. Typical roller supports *(left)* do little to counter that. Porter-Cable's roller and blade guide combination *(right)* is a much more effective system. Supports should contact the blade as low as possible.

▼ BLADE TYPES

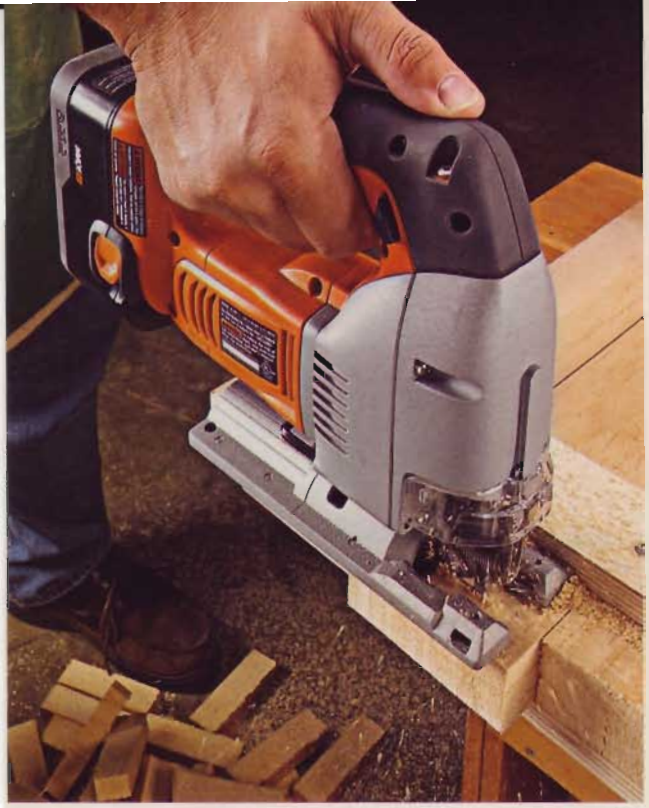
Most of the jig saws in this test accept both T-shank and U-shank (Universal) blades. This versatility is an asset, since you'll be more likely to find precisely the blade you need in one shank style or the other. Saws that accept only one type of shank will limit your blade choices to whatever your local hardware store carries in that style.

▼ CHANGING BLADES

Blade chucks that require a tool do not encourage changing blades when the material or task changes *(Delta shown)*.

A tool-less blade release allows for quick blade changes. This Bosch design even ejects hot blades after use.

Makita and DeWalt *(shown)* use twist knobs to secure the blades. These aren't fast, but they are very secure.



▲Each jig saw was tested for stamina by cutting 2x4s until the battery was exhausted. Smooth running saws with orbital cutting action set the standard.

HOW WE TESTED

Volume Cutting

The first thing everyone wants to know when comparing cordless tools is how much they can do on a single charge. In the case of these jig saws, that can be expressed as how many cuts they make in a certain size board.

It's a valid measure, and we tested the endurance of the saws by working them to exhaustion with pine 2x4s *(Photo, left)*. The test results can be found in the *Report Card* on page 85.

What these numbers don't explain, however, is *why* one tool outperforms another. After all, if it were simply a matter of more voltage or higher amp hours, we could declare the Porter-Cable the winner and move on. The truth is, though, that how *much* power a tool has is secondary to how efficiently it *uses* that power.

During our testing, we found that we could draw a direct correlation between the number of cuts a saw made and three key factors. Those factors are how smoothly the tool runs, its stroke length, and whether it features orbital action for aggressive cutting.

A smooth running tool is a balanced tool. And a balanced tool uses more power for cutting and less to simply vibrate the machine and the user. A longer stroke length does more work on each reciprocation and clears waste more effectively. An orbiting cut is an aggressive cut and also allows the saw to make the most of each blade stroke.

Interestingly, a deficiency in any one of these factors significantly reduces a saw's performance.

An excellent example of that can be seen by comparing the smoothest running saw in this group (the Bosch) to one of the shakiest (Porter-

Cordless Jig Saws

Bosch

Virtues: Exceptionally smooth-running; Powerful; Best blade-changing system; Great dust blower.

Vices: Adjusting the shoe requires an Allen wrench. Blade support allows more flex than we'd like.

Verdict: This is the Gold Standard for cordless jig saws — it has power to spare and plenty of finesse for finer work.

www.BoschTools.com
877-267-2499

DeWalt

Virtues: Powerful; Smooth-running; Good dust blower.

Vices: We didn't care for the lock lever used to adjust the shoe. The twist-knob blade release isn't very convenient.

Verdict: This saw has all the power and control you'll ever need. It's easy to forgive the awkward blade release and shoe lock lever.

www.DeWalt.com
800-433-9258

Ridgid

Virtues: Plenty of power and adequate battery life. Good dust blower. Tool-less blade changing.

Vices: Requires a key to adjust the shoe. Runs a little rough when compared to Bosch or DeWalt.

Verdict: This is a worthwhile addition to the Ridgid cordless line-up with sufficient or better performance in all categories.

www.Ridgid.com
800-474-3443

Cable). The Bosch absolutely eclipsed the Porter-Cable in this test (181 cuts compared to 81). This despite identical stroke lengths and orbital cutting modes (not to mention the Porter-Cable's 19.2-volt battery).

As you look at the numbers in the *Report Card* on page 85, it's accurate to surmise that more cuts equal a smoother-running tool.

One notable exception is the Delta, which performed so poorly during this test that we were only able to complete a handful of cuts before giving up on it altogether. This tool runs smoothly enough, but the short stroke length and absence of any orbital settings rendered it unusable in stock this thick.

Spiral Cutting

Cutting a long 2x4 into hundreds of short 2x4s is an excellent test of a jig saw's powerful, brutish personality. Scroll cutting, then, is a measure of the saw's softer side — and perhaps a better measure of how these tools typically get used.

Our test used an ever-tightening spiral as a guide to determine how "drivable" these saws are. Surprisingly, we didn't see much difference in terms of how tightly the saws could cut before wandering hopelessly off track. We did find that, once again, smoother proved better. It's just easier to keep a saw in line when it's not trying to shake you off.

Just as important to each saw's final grade in this test was a good dust blower. After all, you can't follow a line you can't see. Once again, Bosch took best-of-test honors in this exercise and the Delta proved unsatisfactory because the line became obscured almost immediately. This is due in part to having no blower and in part to a constricted shoe design that causes dust to accumulate directly in front of the blade.

▲ Each saw was equipped with a 20-TPI scrolling blade to trace a tightening spiral. This measured the cornering and dust-blowing characteristics.

Porter-Cable

Virtues: The best shoe adjustment system and detents in the group. Excellent blade support minimizes blade flex. Tool-less blade changing.

Vices: Runs rough.

Verdict: This saw offers better precision than any other thanks to the great shoe design and excellent blade support. Unfortunately, this rough running saw gives up a lot of power that could be used to extend battery life.

www.Porter-Cable.com
877-321-9443

Makita

Virtues: Narrower handle than others, which our testers found more comfortable. The variable-speed dial allows for excellent control in some situations.

Vices: Single-speed trigger can be a liability at times. Top-mounted trigger release proved awkward.

Verdict: A solid performer and a comfortable tool to use despite some occasionally awkward control features.

www.Makita.com
877-462-5482

▲Thick hardwood proved a worthy opponent for the blade supports on most of these saws. The Ryobi struggled especially.

Power Cutting

Jig saw blades are long, thin, narrow, and prone to flex during demanding cuts. Blade supports are intended to minimize that flexing and ensure perpendicular cuts. Based on our testing, that's a pretty tall order.

The test was simple — one cut through a 2"-thick by 7"-wide piece of oak. The shoes were trued up with an accurate square, and each saw was equipped with a brand new 10-teeth-per-inch blade.

After the cut was made, we measured the accuracy of the cut using an engineer's square and a feeler gauge. The greatest variation from perpendicular for each saw is noted in the *Report Card* on page 85.

Despite nearly identical designs in all but one of the supports, the results again covered a large scale. We credit this disparity not to *how* the supports contact the blade, but rather to *where* they contact the blade. Our testing showed that, generally speaking, supports that rest lower on the blade (and thus closer to the cutting point) offered more effective flex control.

This theory also holds true with the top performer in this test, the Porter-Cable. The unique roller-and-side-guide support system of the Porter-Cable provides three points of contact on the blade and supports it directly above the cutting point. The resulting cut (only .008" of variation) speaks for itself.

On the other end of the scale is the Ryobi. The resulting cut with this saw was so poor that we didn't even bother to measure it. This challenges our "low is good" theory because the Ryobi support actually sits well down on the blade.

The limiting factors in this case were more likely the slow blade speed and less aggressive orbital action. The combination of these caused the blade

Cordless Jig Saws

Ryobi

Virtues: Nicely featured considering the extremely affordable price tag.

Vices: Adjusting the shoe requires an Allen wrench to loosen/tighten two screws. The orbital action is not terribly aggressive, and we noticed little difference in the three positions.

Verdict: If you're an occasional jig saw user, this is a good choice to avoid tapping your tool budget. Just remember that it has some limitations.

www.RyobiTools.com
800-525-2579

Delta

Virtues: Runs smoothly and quietly.

Vices: Tool required for every adjustment; Incapable of making aggressive cuts; Bad tendency to gather dust right on the cut line.

Verdict: This Delta-labeled, low-quality import is disappointing on every count. It cuts slowly, poorly, and only with great effort. If a jig saw is an important part of your cordless needs, the combo kit from Delta is not for you.

www.DeltaWoodworking.com
800-223-7278

to heat up quite a bit while making this cut, thus rendering it much more susceptible to flexing.

Cutting Conduit

Our final test was to cut through aluminum conduit. It's not a likely use for these tools, but it was a final opportunity to distinguish between the tools and which factors affect their performance.

Here we found that a variable-speed trigger is valuable. The best way to make this cut was to start at high speed until the blade broke the surface, then slow down to get better control. For that reason, the Makita, which has a variable-speed dial but a single-speed trigger, proved difficult to use in this application.

Once again, the smooth-running Bosch proved the top tool in this exercise because it actually *cut* the conduit instead of just shaking it.

▲Cutting conduit is easier when you can vary the speed of the blade as you cut — fast to get started, slower to maintain control. Smooth running saws also have an advantage.

Final Recommendations

Editor's Choice

BOSCH

As the inventor of the jig saw, Bosch is clearly still committed to building the best-in-class tool.

Should they ever adapt their excellent blade support from their corded jig saws to this tool and add a tool-less shoe adjustment, this jig saw will be perfect. In the meantime, they'll have to settle for simply having an excellent tool.

Top Value

RYOBI

While the Ryobi didn't set any performance records, it's fair to say that this tool is well-suited to the casual DIY market. It has features similar to costlier tools without the price tag.

And considering the bargain price of this saw, its limitations are pretty easy to live with.

CORDLESS JIG SAW REPORT CARD

	SPECIFICATIONS								PERFORMANCE					
Model	Price	Volts	Amp Hrs	Stroke Length	Strokes Per Minute	Orbital Settings	Weight	Blade Type	Blade Change	Shoe Adjust.	2x4 Cutoffs	Scroll Cutting	Blade Flex	Conduit Cutting
BOSCH	$250	18	2.4	1″	0-2,000	3	6.4 lbs	T	A+	B	181	A	.049″	A+
DEWALT	$250	18	2.4	1″	0-2,000	2	5.5 lbs	T,U	B	A	162	A	.079″	A
RIDGID	$200	18	2.0	1″	0-2,200	4	5.5 lbs	T,U	A	B	133	A	.035″	A
MAKITA	$300	18	2.6	1″	500-2,800	3	7.3 lbs	T,U	B	A	105	A	.041″	A
PORTER-CABLE	$260	19.2	2.4	1″	0-2,000	3	5.5 lbs	T,U	A	A+	81	B	.008″	A
RYOBI	$100	18	2.0	1″	0-2,100	3	3.5 lbs	T,U	A	D	72	B	Un	B
DELTA	$300*	18	1.7	5/8″	0-2,700	None	3.5 lbs	T,U	D	D	Un	F	.022″	B

*Available only in a six-piece combination kit T=T-shank; U=Universal Un=Unsatisfactory performance, testing abandoned

Tools & PRODUCTS

WORKBENCH APPROVED

easy tile INSTALLATION

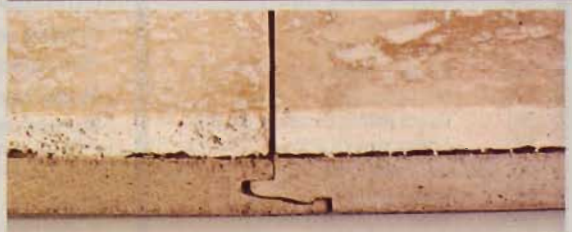
Laying floor tile is a job most do-it-yourselfers can handle, but one that comes with quite a few hassles. After installing a heavy backerboard, you mix and spread mortar, then lay the tile quickly before the mortar sets. All the while, you have to pay close attention to tile spacing and height. Then you have to wait a day before you can grout between the tiles, and another couple of days before walking on your new floor.

Edge Precizion Tile eliminates all these hassles and turns tiling into a one-day endeavor from start to finish. The system starts with tiles that come prebonded to backerboards that simply lock together (*Photos, right*). The tiles, which are available in 23 styles of porcelain, marble, and granite, sit atop a thin underlayment sheet that provides a sound and moisture barrier. The system is similar to that used on laminate flooring, and produces a one-piece "floating" floor.

With the tiles set, you can immediately grout between them using an aerosol can with an applicator tip that guides the right amount of grout into every joint. After a couple hours of drying time, your floor is ready for walking and furniture.

The company sells matching "transition" strips for finishing edges. And you can buy dry-cut diamond blades for cutting tiles to shape.

Edge Precizion tile is available at Lowe's only. Prices (with tile, underlayment, and grout) start around $4 per square foot. For more information, visit www.EdgeFlooring.com



▲ Edge Precizion Tiles simply lock together to make installation easy and to ensure consistent joint lines. Even the canned grout is no-nonsense.

mechanix LIGHTED GLOVES

Mechanix Wear Glove Lights put an end to fumbling in the dark or juggling a flashlight, thanks to their built-in lights. Positioned between the thumb and forefinger, the potent little LED lights shine directly toward your work. Batteries are replaceable. The gloves come in fingerless or full-finger style for about $35. Visit www.Mechanix.com

quick-change SCREWDRIVER

When you need a different-style bit for your screwdriver, the Autoloader from Craftsman (model AL00US; $20) makes it easy. Just pull up the handle cover to draw the bit you've been using in an internal magazine where it can't get lost. Then give the handle a twist to select the bit you need, and push the cover back into place. This pushes the selected bit into position at the end of the shaft. The Autoloader holds six 1/4" hex-shank bits that are nickel-plated for extra durability. For more information, visit www.Craftsman.com